ENVIRONMENTAL IMPACT STATEMENT

LRT Line 6-A and Line 6-B+C Project

Prime Asset Ventures, Inc.

18 July 2019

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LIST OF ABBREVIATIONS

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating Current
ACI-318	American Concrete Institute Building Code Requirements for Structural Concrete
AIEZ	Agro-Industrial Economic Zones
ASTM	American Society for Testing and Materials
ATO	Automatic Train Operation
ATP	Automatic Train Protection
ATS	Automatic Train supervision
BAU	Business as usual
BOT	Build Operate Transfer
BPO	Business Process Outsourcing
CALABARZON	Cavite, Laguna, Batangas, Rizal and Quezon
CCTV	Close Circuit Television
CI	Creative Industries
CLUP	Comprehensive Land Use Plan
CPDO	City Planning and Development Office
DAO	Department Administrative Order
DC	Direct Current
DED	Detailed Engineering Design
DENR	Department of Environment and Natural Resources
DOF	Department of FInance

DOTr	Department of Transportation
DPWH	Department of Public Works and Highways
ECA	Environmentally Critical Areas
ECC	Environmental Compliance Certificate
EDSA	Epifanio de los Santos Avenue
EGF	Environmental Guarantee Fund
EGGAR	Engineering Geological and Geohazard Assessment Report
EIA	Environmental Impact Assessment
EIAMD	Environmental Impact Assessment and Management Division
EIARC	Environmental Impact Assessment Review Committee
EIS	Environmental Impact Statement
EMB	Environmental Management Bureau
EMF	Environmental Monitoring Fund
ENRO	Environment and Natural Resource Office
ERA	Environmental Risk Assessment
ERP	Emergency Response Plan
FCIE	First Cavite Industrial Estate
FGD	Focus Group Discussion
FS	Feasibility Study
GHG	Green House Gases
GOP	Government of the Philippines
Ha	Hectares
HOV	High Occupancy Vehicles
HSHN	High Standard Highway Network
HSSE	Health, Safety, Security, and Environment
ICC	Investment Coordination Committee
IEC	Information, Education and Communication
IRA	Internal Revenue Allotment
IT-BPM	Information Technlogy-Business Process Management
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
KII	Key Informant Interview
LAN	Local Area Network
LCD	Liquid Crystal Display
LGBT	Lesbian, Gay, Bisexual, and Transgender
LGU	Local Government Unit
LLDA	Laguna Lake Development Authority
LOS	Level of Service
LPA	Low Pressure Area
LPPCHEA	Las Piñas-Parañaque Critical Habitat and Ecotourism Area
LRMC	Light Rail Manila Corporation
LRT	Light Rail Transit
LRV	Light Rail Vehicle
LSDF	Luzon Spatial Development Framework
LTMP	Local Traffic Management Plan
LWUA	Local Waterworks and Utilities Administration
MCM	Million Cubic Meters
MENRO	Municipal Environment and Natural Resource Office

MGB	Mines and Geosciences Bureau
MMDA	Metro Manila Development Authority
MMT	Multi-partite Monitoring Team
MMUTIS	Metro Manila Urban Transport Integrated Study
MOA	Memorandum of Agreement
MOO	Manual of Operations
MSEZ	Manufacturing Special Economic Zone
MSME	Micro- and Small and Medium Enterprise
MTP	Medical Tourism Park
NAAQGV	National Ambient Air Quality Guidelines Values
NAIA	Ninoy Aquino International Airport
NCR	National Capital Region
NEDA	National Economic Development Authority
NHA	National Housing Authority
OCC	Operation and Control Center
OCS	Overhead Contact System
OGCC	Office of the Government Corporate Counsel
OLS	Obstacle Limitation Surfaces
OSG	Office of the Solicitor General
OSHS	Occupational Safety and Health Standards
PAGASA	Philippine Atmospheric, Geophysical, and Astronomical Services Administration
PAR	Philippine Area of Responsibility
PAVI	Prime Asset Ventures, Inc.
PEISS	Philippine EIS System
PEZA	Philippine Economic Zone Authority
PHIVOLCS	Philippine Institute of Volcanology and Seismology
PNR	Philippine National Railways
PPE	Personal Protective Equipment
PPP	Public-Private Partnership
PUB	Public Utility Bus
PUD	Planned Unit Development
PUJ	Public Utility Jeepney
PWD	People with Disability
RA	Republic Act
ROR	Reasonable Rate of Return
ROW	Right of Way
SAV	Standalone Validators
SPC	Special Purpose Company
TIA	Traffic Impact Assessment
TMO	Traffic Management Office

1 EXECUTIVE SUMMARY

1.1 Project Fact Sheet PD Summary

The project fact sheet Project Description (PD) Summary is presented in **Table 1-1** below.

Table 1-1. Project Fact Sheet PD Summary

<table>
<tr><td>Project Name</td><td>LRT Line-6A and Line-6B+C Project (“Project”)</td></tr>
<tr><td>Project Location</td><td>LRT Line-6A: commencing from Niog Station in Bacoor City to Governors Station in Dasmariñas City with 8 stations and approximate route length of 23.5 km. Alignment will traverse segments of Molino Boulevard, privately-controlled properties and segments of Molino-Paliparan Road
LRT Line-6B: commencing from NAIA Terminal 1/Terminal 2 Station until San Nicolas Station in Bacoor City with 10 stations and approximate route length of 16 km. Alignment will traverse segments of Dr. A. Santos Avenue, A. Canaynay Avenue, CAA Road, Marcos Alvarez Ave., M. Alvarez Extension and Alabang-Zapote Road and will pass through some privately-controlled properties.
LRT Line-6C: commencing from Sucat Station until Lakefront Station with 6 stations and approximate length of 7.7 km. Alignment will traverse Dr. A. Santos Avenue.
Alabang Zapote LRT Line with four stations and approximate length of 5 km from Marcos Alvarez Station in Las Piñas City to Star Mall Station in Muntinlupa City. Alignment will traverse Alabang-Zapote Road.</td></tr>
<tr><td>Geographic Coordinates</td><td>The geographic coordinates of the LRT Line-6 stations are provided below.
<table>
<tr><th>Stations</th><th>Location</th><th>Geographic Coordinates</th><th></th></tr>
<tr><td colspan="2">LRT Line-6A</td><td>°N Latitude</td><td>°E Longitude</td></tr>
<tr><td>Niog</td><td>Bacoor</td><td>14° 27’ 20.72”</td><td>120° 57’ 38.20”</td></tr>
<tr><td>Bacoor City Hall</td><td>Bacoor</td><td>14° 26’ 08.16”</td><td>120° 58’ 07.60”</td></tr>
<tr><td>San Nicolas</td><td>Bacoor</td><td>14° 24’ 33.97”</td><td>120° 58’ 35.74”</td></tr>
<tr><td>Daang Hari</td><td>Bacoor</td><td>14° 23’ 04.10”</td><td>120° 58’ 48.28”</td></tr>
<tr><td>Alabang</td><td>Bacoor</td><td>14° 22’ 25.19”</td><td>120° 59’ 49.73”</td></tr>
<tr><td>San Pedro</td><td>Dasmariñas</td><td>14° 21’ 14.38”</td><td>120° 59’ 51.63”</td></tr>
<tr><td>La Salle</td><td>Dasmariñas</td><td>14° 19’ 43.77”</td><td>120° 59’ 11.88”</td></tr>
<tr><td>GMA</td><td>Dasmariñas</td><td>14° 18’ 42.36”</td><td>120° 59’ 19.18”</td></tr>
<tr><td>Governor’s Drive</td><td>Dasmariñas</td><td>14° 17’ 18.63”</td><td>120° 59’ 18.50”</td></tr>
<tr><td colspan="4">LRT Line-6B</td></tr>
<tr><td>Sucat</td><td>Parañaque</td><td>14° 29’ 05.45”</td><td>120° 59 35.35”</td></tr>
<tr><td>Canaynay</td><td>Parañaque</td><td>14° 28’ 44.33”</td><td>120° 58’ 52.84”</td></tr>
<tr><td>Naga</td><td>Las Piñas</td><td>14° 27’ 39.23”</td><td>120° 59’ 40.98”</td></tr>
<tr><td>Alabang-Zapote</td><td>Las Piñas</td><td>14° 26’ 46.58”</td><td>120° 59’ 38.42”</td></tr>
<tr><td>Marcos- Alvarez</td><td>Las Piñas</td><td>14° 26’ 15.80”</td><td>120° 59’ 18.99”</td></tr>
<tr><td>Apollo</td><td>Las Piñas</td><td>14° 25’ 40.70”</td><td>121° 00’ 09.49”</td></tr>
<tr><td>Queen’s Row</td><td>Las Piñas</td><td>14° 25’ 19.65”</td><td>120° 59’ 48.47”</td></tr>
<tr><td>San Nicolas</td><td>Bacoor</td><td>14° 24’ 33.97”</td><td>120° 58’ 35.74”</td></tr>
<tr><td colspan="4">LRT Line-6C</td></tr>
<tr><td>Sucat</td><td>Parañaque</td><td>14° 29’ 05.45”</td><td>120° 59’ 35.35”</td></tr>
<tr><td>Canaynay</td><td>Parañaque</td><td>14° 28’ 44.33”</td><td>120° 58’ 52.84”</td></tr>
<tr><td>El Grande</td><td>Parañaque</td><td>14° 28’ 08.59”</td><td>121° 00’ 39.46”</td></tr>
<tr><td>San Antonio</td><td>Parañaque</td><td>14° 27’ 52.53”</td><td>121° 01’ 12.88”</td></tr>
<tr><td>St. James</td><td>Parañaque</td><td>14° 27’ 30.82”</td><td>121° 01’ 54.70”</td></tr>
<tr><td>Lake Front</td><td>Muntinlupa</td><td>14° 27’ 10.31”</td><td>121° 02’ 55.03”</td></tr>
<tr><td colspan="4">Alabang-Zapote LRT Line</td></tr>
<tr><td>Marcos Alvarez</td><td>Las PIñas</td><td>14° 26’ 15.80”</td><td>120° 59’ 18.99”</td></tr>
<tr><td>Town Center</td><td>Las Piñas</td><td>14° 25’ 50.92”</td><td>121° 00’ 56.48”</td></tr>
<tr><td>Madrigal</td><td>Muntinlupa</td><td>14° 25’ 33.74”</td><td>121° 01’ 41.74”</td></tr>
<tr><td>Star Mall</td><td>Muntinlupa</td><td>14° 25’ 02.97”</td><td>121° 02’ 42.84”</td></tr>
</table></td></tr>
</table>

Nature of Project	**New elevated railway system** The proposed Project is an Unsolicited Proposal for Public-Private Partnership (PPP) submitted to the Philippine Government through the Department of Transportation (DOTr) on 13 January 2017 (**Appendix 1**). In a letter dated 23 July 2018, DOTr required Prime Asset Ventures, Inc. (PAVI) to submit an ECC among other requirements to expedite the National Economic Development Authority (NEDA) evaluation and approval of the project (**Appendix 2**). DOTr subsequently issued the Original Proponent Status to PAVI on February 2019 (**Appendix 3**).
Project Rationale	The policy objective for the proposed project is to pursue and achieve sustainable development of the Cavite area and southern Metro Manila by providing convenient, affordable and safe movement through a newly constructed mass transit system. The new railway line is expected to catalyze economic growth and development through the generation of various business and job opportunities along the railway corridor or railway alignment. The mass transit system is also expected to help solve the traffic problems in the area.
Project Components	The Project will consist of four interconnected railway lines, a total of 23 stations with three common stations, a maintenance depot, signaling and communication system, fare collection system, and traction electrification system.
Manpower	At least 5,000 workers will be needed during the construction phase of the Project. During project operation, about 700 to 1,200 personnel will be necessary to maintain and operate the various railway segments of LRT 6.
Capital Cost	The estimated project cost is Php72.2 billion.
Project Duration	Construction activities are estimated to be completed within 3.5 years for each railway line and will commence once government approvals and permits are secured by the project proponent.
Proponent Contact Details and Profile	
Proponent's Name	Prime Asset Ventures, Inc. (see **Appendix 4** for Proponent Accountability Statement)
Authorized Representative	Tony Tan
Contact Details	02.226.3552 local 1041 gecsmatt@yahoo.com
Proponent's Address	UG/F Worldwide Corporate Center Highway Hills, Shaw Boulevard, Mandaluyong City
Proponent Profile	PAVI is a 100% Filipino owned company that was incorporated on 18 August 2011 as an investment and holdings company with focus on building and development community infrastructure. PAVI and its subsidiaries have invested in various industries including power and water utilities, information technology, and telecommunications. Through the development and management of different types of infrastructure, PAVI aims to ensure that lives in its partner communities are made better and kept constantly connected. PAVI's Prime Water Infrastructure Corp. has over 30 years industry experience by providing water and sewage management solutions in over 124 cities and municipalities within the 16 regions of the Philippines. Solorex Water Technologies, Inc. has over 25 years industry experience and is engaged in supplying water filtration, sterilization and purification equipment. PAVI also has interests in power systems infrastructure through Kratos Res, Inc., S Power Corporation and Powersource Group, and information and communication through ePrime and Streamtech.
EIA Preparer Contact Details	
EIA Preparer	Seastems, Inc. (see **Appendix 5** for EIA Preparer's Accountability Statement)
Authorized Representative	Alvin F. Nacu President
Address	Room 314 Philippine Social Science Center Commonwealth Avenue, Diliman, Quezon City
Contact Details	+63.917.840.7192 info@seastems.com; alvin.nacu@seastems.com

1.2 Process Documentation of the conduct of the EIA

1.2.1 EIA Team

The Environmental Impact Assessment (EIA) Team consists of the following key specialists:

Table 1-2. List of EIA Team Members

Name of Specialist	Assigned EIA Module	EIA Preparer Number
Alvin Nacu	EIA Team Leader	IPCO – 068
Armie Jean Perez	Physical Environment / EIA Integration	IPCO – 071
Arriane C. Tabanao	Geology	0001658[1]
Jose Alan Castillo, PhD	Terrestrial Ecology	-
Daniel Torres	Terrestrial Wildlife	-
Jethro Alden C. Hipe	Meteorology/ Air and Noise Quality	IPCO – 005
Ma. Theresa T. Agravante	Socio-economy / Public Participation	IPCO – 151
Randolph Carreon	Traffic	-
Pedro Peralta, Jr.	GIS/Mapping	IPCO – 254

1.2.2 EIA Study Schedule and Area

The EIA study commenced with the pre-scoping activities conducted from 24 October to 04 December 2018 in the five host cities (Parañaque, Las Piñas, Muntinlupa, Bacoor and Dasmariñas) and 35 host barangays. The pre-scoping activities included courtesy visits and information, education and communication (IEC) campaign with city and barangay local government unit (LGU) officials, key informant interviews with LGU department heads and staff (e.g. City Planning and Development Office (CPDO), City Traffic Management Office (TMO), City Engineering Office, etc.), and focus group discussions with selected barangay and city officials.

The request for public scoping was submitted to the Department of Environment and Natural Resources Environmental Management Bureau (DENR-EMB) after completion of the pre-scoping activities. The request for scoping was submitted together with the following documents:

- Letter request for public scoping addressed to DENR-EMB
- Proof of conduct of IEC (documentation of IEC, FGD and KIIs) (**Appendix 6**)
- Initial perception survey results (**Appendix 7**)
- Proposed list of invitees for public scoping (**Appendix 8**)
- Draft invitation letter
- Draft presentation material

Preparation for the public scoping was commenced after DENR approved the scoping schedule. Arrangements for the scoping venue were finalized and the invitation letters from DENR were distributed to the identified project stakeholders.

The city-level public scoping was held from 18 to 20 February 2019 in the five host cities of the LRT 6 project. A public scoping report (**Appendix 9**) was prepared after the scoping activities and this was submitted to DENR EMB together with the request for technical scoping. The technical scoping with EIA review committee members and EIARC resource persons was held on 08 March 2019 at the Environmental Impact Assessment and Management Division (EIAMD) Conference Room. The scoping checklist accomplished during the technical scoping is presented in **Appendix 10**.

Data collection for the EIA study was conducted from 11 March to 29 April 2019 while report writing was done from April to May 2019. Client review of the draft Environmental Impact Statement (EIS) was done on June 2019, after which a copy was submitted to DENR EMB for procedural screening.

[1] Professional Registration Commission (PRC) ID No. as Registered Geologist

1.2.3 EIA Methodology

The methods used in the EIA study are summarized in **Table 1-3**.

Table 1-3. Methodology used in the EIA Study

Baseline Parameter	Data Requirements (Annex 2-7A)	Approach/Methodology	
		Baseline Characterization	Impact Assessment
Land Use and Classification	• Description of existing land use/ zoning/classification • Land use map including location of Environmentally Critical Areas (ECAs) and special land features • Devaluation of land values due to improper waste disposal	• Obtain land use maps and comprehensive land use plans (CLUPs) from host LGUs • Field observations during ride through and site visit of project alignment • Satellite imageries available from Google Earth	• Assess project impacts on land use and land values during the construction and operation phases • Estimate the waste generation during the construction and operation phases and determine possible locations of waste disposal areas
Geology/ Geomorphology	• Regional geology, geomorphology, stratigraphy and tectonic setting • Local geology • Geologic hazards	• Obtain secondary data from Mines and Geosciences Bureau and PHIVOLCS • Collect secondary information from published and unpublished sources • Field observations during ride through and site visits to project alignment	• Determine the possibility of occurrence of ground subsidence, landslides or other natural hazards as a result of project construction • Determine the possibility of occurrence of soil erosion and runoff from borrow sites/quarries
Terrestrial Ecology	• Flora and fauna species inventory • Summary of endemicity/ conservation status • Summary of abundance/frequency of distribution • Site observation/transect walk map	• Conduct field observations along project alignment • Key informant interviews • Collect secondary information from published and unpublished sources • Determine conservation and protection status of identified species based on DENR and IUCN guidelines	• Predict the project impacts on protected areas, if any • Estimate the extent of land clearing activities during site preparation and project construction and determine how this will affect biodiversity and habitats
Hydrology/ Hydrogeology	• Drainage systems • Regional hydrogeology • Streamflow measurements/mean monthly flow data • Flood peaks, volumes and rating curves with storm water flow estimates • Groundwater conditions	• Collect data from DPWH, LWUA and other concerned offices/agencies • Conduct flow measurements, if necessary	• Determine project impacts on hydrologic conditions of natural drainage channels and assess the possibility of occurrence of flooding and inundation resulting from project activities • Assess project impacts on sediment quality due to wastewater generated during the construction and operation phases of the project • Determine project impacts on groundwater flow due to construction of tunnel and other underground facilities
Water Quality	• Physico-chemical and bacteriological characteristics of groundwater and inland surface waters • Sampling site map	• Collect grab surface water samples from pre-identified sampling stations • Store water samples in sterilized sampling bottles provided by the environmental laboratory • Submit water samples for laboratory analysis of identified parameters • Collect secondary data on river/lake water quality from concerned agencies (DENR EMB, LLDA, etc.)	• Predict impacts of construction activities on surface water quality with particular emphasis on siltation and sedimentation resulting from construction activities and wastewater disposal from the construction camp • Predict impacts of project operation on surface water quality particularly on wastewater

Baseline Parameter	Data Requirements (Annex 2-7A)	Approach/Methodology	
		Baseline Characterization	**Impact Assessment**
		• Compare results to DENR water quality standard values	discharges from the stations, substations and depot facilities
Meteorology/ Climatology	• Monthly average rainfall of the area • Climatological normal and extremes • Wind rose diagrams • Frequency of tropical cyclones • Climate change projections	• Obtain climate data (normal and extremes), wind rose diagrams, frequency of occurrence of tropical cyclones, and climate change projections from PAGASA and other data sources	• Estimate the CO_2 emissions from construction equipment and machinery and assess how this will contribute to greenhouse gas emissions • Estimate possible increase or decrease in CO_2 emissions for both with and without the project scenario
Air Quality	• Ambient concentrations of TSP, SO_x, NO_x, PM_{10}, etc.	• Collect ambient air samples from pre-identified sampling stations • Submit samples to third-party environmental laboratory for analysis of parameters • Compare results to National Ambient Air Quality Guideline Values	• Obtain data on typical dust and gaseous emissions from construction equipment and machinery from published and unpublished sources • Predict contribution of gaseous and dust emissions to ambient air quality • Assess project impacts to air quality during project operation
Noise	• Noise levels	• Measure noise levels using handheld noise level meter in identified sampling stations	• Obtain data on typical noise emissions from construction equipment and machinery and predict how these will affect the neighboring communities during the construction phase • Obtain data on typical noise emissions from train operations and predict how this will affect the surrounding communities during the operation phase
People	• Demography • Settlement and population distribution • Population growth rate • Number of households and household size by barangay • Summary of demographic data per barangay to be directly affected focusing on land area, population, population density, main sources of income, gender and age composition, literacy, highest educational attainment, and employment status • Household profile based on results of socio-economic/perception survey	• Conduct literature survey of relevant documents from the regional, provincial, city/municipal and barangay LGUs including previous feasibility studies • Conduct a quick demographic analysis of the project areas • Identify the dominant economic activities and land ownership/land access modes especially of communities in the proposed project sites and how they will be affected by the project • Gather relevant cultural and historical information on current inhabitants, informal settlers, and indigenous peoples, if any • Locate the project within the regional (NCR and CALABARZON), city/ municipality and barangay development plans • Identify project stakeholders especially private property and business owners, informal settlers, poor communities, vulnerable sectors	• Predict project impacts on the host communities particularly to the vulnerable sectors (poor residents, children, women, senior citizens, indigenous peoples, if any) • Predict the economic impacts of the project during the construction and operation phases • Predict the project impacts on utilities (water, power, communication) and determine the possibility of competition for these resources • Predict the project impact on traffic conditions during the construction and operation phases • Assess the project impacts on community dynamics, particularly the possibility of the disruption of communities, due to the construction of infrastructure

Baseline Parameter	Data Requirements (Annex 2-7A)	Approach/Methodology	
		Baseline Characterization	Impact Assessment
		(children, women, senior citizens, PWDs, etc.) for possible relevant inputs and insights towards the project • Rapid scanning of land resource utilization and resettlement management policies, projects and programs related to the project • Conduct barangay consultations and city/municipal level scoping meetings	• Predict the project impacts on historical and cultural resources during the construction and operation phases • Predict the possible project impacts on public health and occupational health and safety • Assess the possibility of occurrence of traffic accidents during the construction phase
Traffic	• Transportation/traffic situation	• Existing traffic condition on major roads along the project alignment	• Traffic impact during project construction

1.2.4 Public Participation

The following public participation activities were conducted for this EIA study.

Table 1-4. Public Participation Activities for the EIA of the LRT 6 Project.

Public Participation Activity	Date	Participant/s	No. of Participants
Courtesy visits, key informant interviews, focus group discussions and IEC campaign	24 October 2018	• Parañaque City Hall – Office of the Mayor • Barangay San Antonio, Parañaque City • Barangay San Isidro, Parañaque City • Barangay San Dionisio, Parañaque City • Barangay Sto. Nino, Parañaque City • Barangay La Huerta, Parañaque City • Barangay BF Homes, Parañaque City	16
	25 October 2018	• Parañaque City Mayor Edwin Olivarez • Office of the City Administrator, Muntinlupa City	2
	26 October 2018	• Dasmariñas City Mayor Elpidio Barzaga and City Administrator Aisa Sango	2
	06 November 2018	• Office of the City Administrator, Las Piñas City	1
	12 November 2018	• Muntinlupa City Mayor Jaime Fresnedi • Muntinlupa CPDO Noel Cardona • Barangay Sucat, Mujntinlupa City • Barangay Alabang, Muntinlupa City • Barangay Ayala Alabang, Muntinlupa City • Barangay Cupang, Muntinlupa City	20
	14 November 2018	• Bacoor CPDO Engr. Jesus Francisco • Office of the Bacoor City Administrator • Bacoor Barangay Affairs Office • Barangay Talaba IV, Bacoor City • Barangay Molino III, Bacoor City	10
	15 November 2019	• Barangay Molino VI, Bacoor City • Bacoor City Traffic Management Department • Barangay Molino IV, Bacoor City • Barangay Niod III, Bacoor City • Barangay Molino I, Bacoor City	17
	16 November 2019	• Barangay San Nicolas III, Bacoor City • Barangay Bayanan, Bacoor City • Barangay Molino II, Bacoor City • Barangay Ligas III, Bacoor City • Barangay San Nicolas II, Bacoor City • Barangay San Nicolas I, Bacoor City	18

Public Participation Activity	Date	Participant/s	No. of Participants
		• Barangay Ligas II, Bacoor City	
	19 November 2018	• Barangay Cupang, Muntinlupa City • Barangay Alabang, Muntinlupa City	11
	27 November 2018	• Office of the City Administrator and City Planning and Development Office, Las Piñas City	3
	28 November 2018	• Dasmariñas City Mayor Elpidio Barzaga, City Administrator Aisa Sango and City Assessor Engr. Mildred Laudato • Barangay Salawag, Dasmariñas City • Barangay Paliparan III, Dasmariñas City • Barangay Paliparan II, Dasmariñas City • Barangay Paliparan I, Dasmariñas City	12
	04 December 2018	• IEC presentation for Las Pinas City LGU and barangay officials • Barangay Paliparan II, Dasmariñas City • Barangay Paliparan, Dasmariñas City	30
Public scoping	18 February 2019 Parañaque City	• City Planning and Development Officer • Representatives from the City Engineering Office and City Traffic Management Office • Representatives from six host barangays • Representatives from homeowners associations along project alignment • Representatives from medical and educational institutions • Representatives from business sector • EMB NCR representative	47
	19 February 2019 (9:00 – 11:00AM) Bacoor City	• LGU representatives from the Mayor's Office, Sangguniang Panlungsod members, City Planning Office, City Engineering Office, Barangay Affairs Office and Traffic Management Department • Representatives from 9 out of 13 impact barangays • Representatives from medical and educational institutions • Representatives from homeowners associations, • Representatives from the business sector • Representatives from transport groups	66
	19 February 2019 (1:30 – 3:30 PM) Dasmariñas City	• LGU representatives (City Vice Mayor, Sangguniang Bayan members, City Traffic Management Bureau) • Representatives from three out of four impact barangays • Representatives from educational institutions • Representatives from the business sector	31
	20 February 2019 (9:00 – 11:30AM) Las Piñas City	• LGU representatives from the City Administrator, City Planning Office, some members of the city council, City Engineering Office and Traffic Management Bureau • Representatives from seven out of eight host barangays • Representatives from medical and educational institutions • Representatives from the business sector • Representatives from transport groups	55
	20 February 2019 (1:30 – 3:30 PM) Muntinlupa City	• LGU representatives from the city council, City Planning Office, City Engineering Office, Traffic Management Department and Public Information Office • Representatives from one out of four impact barangays • Representatives from medical and educational institutions • Representatives from the business sector • Representatives from the Parañaque and Muntinlupa City Police Departments	32
Perception Survey and key informant interviews	25-27 April 2019	• Project affected stakeholders along the project alignment	87

Table 1-5 presents the summary of issues and concerns raised during the IEC activities while **Table 1-6** presents the analysis of stakeholder perception during the IEC activities. **Table 1-7** presents the summary of issues and concerns raised during the public scoping sessions.

Table 1-5. Summary of Issues and Concerns raised during the IEC Activities.

Issues and Concerns	Parañaque	Muntinlupa	Las Piñas	Bacoor	Dasmariñas
Project Description					
Project stage and completion date		✓	✓		
Project alignment has sharp curves				✓	✓
No problem with project alignment since structure is elevated and will be built on center island				✓	
Why is project alignment off the road?				✓	✓
Why does alignment not pass through Aguinaldo Highway?					✓
Exact location of project alignment				✓	✓
Constructing piers on road will decrease road width				✓	✓
Consider electricity posts on both sides of the road				✓	
Structure might collapse on houses				✓	
Consider other infrastructure and development projects in the city			✓	✓	✓
Air					
Noise impact especially at night	✓			✓	
People					
Officials were already aware about the project	✓			✓	
LGU welcomes the project	✓	✓	✓	✓	✓
Jeepney operators and drivers associations, business establishments, subdivisions and affected schools should be invited to the public scoping	✓	✓	✓	✓	✓
Expansion of business opportunities is foreseen		✓			
Increased daytime foot traffic and business activity is expected		✓			
Traffic impact during construction is expected	✓	✓	✓	✓	✓
Project will ease traffic problem		✓	✓	✓	✓
Subsequent road widening will affect houses along the road				✓	✓
Avoid ROW acquisition on private properties				✓	
Will project contribute to barangay IRA?				✓	
Project will shorten travel time to Metro Manila					✓
Rerouting will be necessary during construction				✓	
Access of residents will be hampered during construction				✓	
Others					
Project will improve transport system	✓	✓	✓		
Proper spoils management during construction	✓				
Project will augment needed road infrastructure		✓	✓		
No major negative impact is foreseen			✓	✓	

The consultant and proponent representatives were able to talk to a total of 127 stakeholder representatives mostly from LGU offices of the five host cities and 35 host barangays during the IEC. Among the five host cities, all except Muntinlupa were already aware about the project through information disseminated by the project proponent. All host barangays in Parañaque City were already aware about the project but the host barangays of other host cities were not yet aware about the project alignment. All the representatives of the host cities and barangays welcome the project and are eagerly awaiting project implementation to ease traffic congestion in their areas (**Table 1-6**). Issues and concerns raised during the IEC are summarized in **Table 1-7**. Stakeholders foresee no major negative impacts from the project.

Table 1-6. Analysis of Stakeholder Perception during the IEC

Stakeholder Representative	No. of Respondents	Awareness about the Project		Source of Information	Do you want project to proceed?	
		Yes	No		Yes	No
Parañaque City LGU	3	✓		Proponent	✓	
Barangay San Antonio	3	✓		Mayor's Office	✓	
Barangay San Isidro	3	✓		Mayor's Office	✓	
Barangay San Dionisio	3	✓		Mayor's Office	✓	
Barangay Sto. Nino	2	✓		Mayor's Office	✓	
Barangay La Huerta	1	✓		Mayor's Office	✓	
Barangay BF Homes	1	✓		Mayor's Office	✓	
Muntinlupa City LGU	4		✓		✓	
Barangay Sucat	2		✓		✓	
Barangay Alabang	2		✓		✓	
Barangay Ayala Alabang	3		✓		✓	
Barangay Cupang	9		✓		✓	
Bacoor City LGU	5	✓		Proponent	✓	
Barangay Talaba IV	2		✓		✓	
Barangay Molino III	5		✓		✓	
Barangay Molino VI	9		✓		✓	
Barangay Molino IV	3		✓		✓	
Barangay Niog III	2		✓		✓	
Barangay Molino I	2		✓		✓	
Barangay San Nicolas III	4		✓		✓	
Barangay Bayanan	2		✓		✓	
Barangay Molino II	2		✓		✓	
Barangay Ligas III	2		✓		✓	
Barangay San Nicolas II	2		✓		✓	
Barangay San Nicolas I	3		✓		✓	
Barangay Ligas II	3		✓		✓	
Las Piñas City LGU	3	✓		Proponent	✓	
Host Barangays	30		✓		✓	
Dasmariñas City LGU	3	✓		Proponent	✓	
Barangay Salawag	2		✓		✓	
Barangay Paliparan III	1		✓		✓	
Barangay Paliparan II	3		✓		✓	
Barangay Paliparan I	3		✓		✓	
	127					

Table 1-7. Summary of Issues and Concerns Raised during the City Level Public Scoping Meetings

Issues and Concerns	Parañaque	Bacoor	Dasmariñas	Las Piñas	Muntinlupa
Project Description					
Provision of technical documents/exact project alignment so stakeholders can determine project impacts to their areas	✓	✓		✓	✓
Consideration of climate change in project design	✓				
Expected start of project construction and length of construction period; simultaneous construction?	✓	✓	✓	✓	✓
Proper waste management during construction	✓			✓	
Interconnection of LRT-6 with other railway projects	✓		✓		
Acquisition of right of way in private properties	✓				
Timing of project implementation should consider other infrastructure projects in the area	✓			✓	✓
Aesthetic aspects of project	✓				
Conflict with other planned infrastructure projects and coordination with concerned agencies		✓		✓	✓

Issues and Concerns	Parañaque	Bacoor	Dasmariñas	Las Piñas	Muntinlupa
Roads along project alignment are narrow; road widening should be done to accommodate this project as well as other infrastructure projects		✓	✓	✓	✓
Compatibility of project with Comprehensive Land Use Plan		✓			✓
Presence of station near Bacoor City Hall and accessibility of stations to LRT users		✓			
Provision of public transportation terminal in selected or all LRT stations		✓		✓	
Project alignment on major roads and private properties		✓	✓		
Construction of project on the shoreline rather than busy roads			✓		
Observation of proper road setback in anticipation of the project and other road infrastructure projects			✓		
Underground railway instead of overhead railway	✓				✓
Land					
Seismic analysis to determine location of active faults					✓
Water					
Liquid waste management during construction	✓				
Disallow squatting on waterways traversed by the project to avoid flooding and drainage concerns	✓				
Air					
Project impacts on noise, vibration, air quality	✓	✓		✓	✓
People					
Hampered access of residents and business establishments during project construction and operation	✓			✓	
Compensation of damage to public and private roads and public infrastructures	✓				
Livelihood displacement	✓			✓	
Mass transportation as solution to traffic problems but affected stakeholders will have to bear with the inconvenience during construction	✓				
Conduct survey to identify major traffic issues that should be addressed during project construction	✓				
Submission of Traffic Impact Study and Traffic Management Plan to LGU	✓			✓	✓
Roads along project alignment are very busy and used by several residents as well as schools and business establishments	✓	✓	✓	✓	✓
Regular information dissemination and consultation regarding project timelines and schedules				✓	✓
Others					
Relocation of informal settlers in existing roads that can be used as alternate access of residents during construction phase	✓				
Construction of bridge over Laguna Lake to connect southern and northern parts of Metro Manila bypassing EDSA, C-5 and other busy roads	✓				
Technical impact of project such as on drainage, sewer lines, vibration, noise, sound, magnetic intervention, etc.					
Conduct IEC for each impact barangay to let everyone know about the project		✓			
Creation and operation of MMT			✓	✓	
Non-compensation of private property owners whose properties were affected by road construction in Paliparan 1, 2 and 3			✓		
Discussion of issues raised during Public Scoping in Technical Scoping			✓		
Project impact on private business development plans					✓
Information sharing on LGU social media platform					✓

1.3 EIA Summary

1.3.1 Summary of Alternatives

Siting

LRT Line 6 was originally intended as the Phase 2 of the LRT-1 South Extension from Niog Station in Bacoor City to Governor's Drive Station in Dasmariñas City passing through Aguinaldo Highway. The proposed project which consists of four separate alignments that will connect southern Metro Manila with Cavite Province as well as the eastern and western sections of Parañaque City and Muntinlupa City will provide an alternative connection between the southern cities of Metro Manila and the northern cities of Cavite Province. LRT Line-6A which will pass through Bacoor Boulevard, Molino-Paliparan Road and on privately controlled properties was chosen as the alignment of the LRT-1 south extension since it will provide wider space for construction compared to the limited space along Aguinaldo Highway which is further constrained by the presence of 69kV transmission lines that will create an obstacle when using cranes during the erection of pre-fabricated I-girders.

The other project alignments which are located in the cities of Parañaque, Las Piñas and Muntinlupa are experiencing rapid development through the establishment of commercial centers and housing projects whose residents commute to Metro Manila daily for work and other business. The rapid development in these areas have resulted in traffic congestion along major road networks and this project is seen as one of the best transport alternatives that can alleviate the traffic condition in these areas.

In terms of natural hazards, the project sites are susceptible to ground shaking along with the rest of the country that is located within the Philippine mobile belt. The nearest seismic generator to the project site is the West Valley Fault and PHIVOLCS has assessed the proposed LRT 6 stations to be safe from ground rupture. The eastern and western sections of LRT Line-6C and the northern segment of LRT Line-6A were assessed to have moderate to high susceptibility to liquefaction hazards while the western segment of LRT Line-6B+C and the northern segment of LRT Line-6A are within the tsunami inundation zone.

In terms of right of way (ROW) issues, land acquisition is foreseen in certain sections of LRT Line-6B located within Parañaque and Las Piñas cities. The project proponent is expected to acquire affected properties according to local and international guidelines on ROW acquisition for infrastructure projects.

Technology Selection

The horizontal and vertical alignments as well as the routes of the proposed project minimized land acquisition issues and impacts along the routes. The project also aimed to reduce initial investment costs as well as operation and maintenance costs; provide a fast, convenient, safe and comfortable service to users; and connectivity of the project to other transport modes and railway lines.

To reduce initial investment costs, the LRT Line 6 alignments will be elevated except for sections within privately controlled properties which will be on embankment. The use of ballasted track type will also help reduce initial investment costs although the final selection will be done during the detailed engineering design stage.

The elevated structures will be designed to comply with the minimum vertical clearance requirement of DPWH and will be consistent with the latest version of Philippine and international standards on infrastructure and transportation development.

1.3.2 Summary of main impacts and residual effects after applying mitigation

The main impacts of the proposed project as well as the proposed mitigation/enhancement measures are summarized in the matrix below. During the pre-construction and construction phases, the main project impacts include ROW acquisition along the alignment of LRT Line-6B, noise and dust generation, and traffic congestion in project segments where construction activities are taking place. During project operation, the project will help

alleviate the worsening traffic conditions in the host cities since it will provide an alternative transport option for residents to and from Metro Manila.

Table 1-8. Summary of Key Environmental Impacts and Environmental Management Plan

Environmental Component	Potential Impact	Mitigation/Enhancement Measures	Residual Impacts
Pre-Construction/Construction			
Land use and classification	Change in existing land use along project alignments	Final project alignment should be communicated to host LGUs to ensure that the project will be considered in the land use and zoning plans of host cities.	None
	Potential conflicts with other government and private infrastructure projects	PAVI should coordinate with concerned agencies such as DPWH and the host LGUs	None
	ROW acquisition will be necessary in some sections of the project alignment	Project design should aim to minimize ROW acquisition and if is inevitable, ROW acquisition should be done according to existing local and international guidelines on ROW acquisition. A resettlement action plan should be prepared in consultation with project affected persons and host LGUs and concerned government agencies	This is a residual project impact. Proper compensation should be provided to affected residents and business owners to minimize this impact.
	Project can affect visual aesthetics and devaluation of land value can occur if construction sites are not managed properly	Installation of fence or screens to cover the construction site will minimize negative visual impacts. Unnecessary equipment and other materials should be removed from the site.	None
Geology	Project will be prone to seismic hazards such as groundshaking, liquefaction and tsunami	Proper engineering design in accordance with the results of the geotechnical study and the requirements of the National Building and Structural Code of the Philippines; footings and foundations must consider the peak acceleration for worst case earthquake scenarios	The risk of seismic hazards will remain with or without the project. This should be addressed by proper engineering design.
	Change in subsurface/ underground geomorphology	Monitoring of changes in geological subsurface including rock formations or soil/sand characteristics and cracks that may have significant implications on design and integrity of the structure	None
Soils	Unprotected excavated soils can be washed off during heavy rains	Soils and construction wastes should be covered appropriately; topsoil should be secured and stored properly for later reuse during revegetation	None
Terrestrial Ecology	Loss of habitat and habitat fragmentation due to vegetation removal along project alignment	Green spaces should be maintained during the construction phase. Vegetation clearing should be kept to a minimum and done only when necessary	None
	Removal of vegetation cover can threaten the endemic plants in the project sites	Plants that will be lost to clearing should be salvaged by collecting seedlings and tending them in a nursery for use in revegetating the area	None
	Road kills of terrestrial fauna can occur during transport of construction materials, personnel and machinery	Implement road safety standards when using the access roads. Drivers and construction personnel should be informed about policies and actions to apply when dealing with injured terrestrial fauna	This is a residual project impact.
	Collection of terrestrial fauna by construction related personnel	Personnel and workers should be informed that collection of wildlife is prohibited and will be subject to penalties provided by the law	None
Water Quality	Silt laden surface runoff from active construction areas can drain into nearby surface water bodies	Silt control and silt protection measures such as silt traps should be in place in active construction areas.	None
	Oil and grease contamination can occur due to spills and leaks from construction equipment and machinery	Oil sumps should be installed in active construction areas to minimize discharge of oil spills and leaks from construction equipment, machinery and vehicles.	None

Environmental Component	Potential Impact	Mitigation/Enhancement Measures	Residual Impacts
Air Quality and Noise	Dust generation will be significant in active construction areas	Dust suppression techniques will be applied such as water application and speed restriction. Water application should be done in 3.2 hr intervals and speed restriction at active construction sites can reduce fugitive dust generation. Trucks delivering construction materials and stockpiles of construction materials should be covered to prevent fugitive dust from escaping.	None
	Noise disturbance will be evident in active construction areas	Use of mufflers and regular maintenance of construction equipment, machinery and vehicles can minimize sound levels in active construction sites. Construction activities should be limited during leisure hours, hours of sleep and anytime when loud and continuous noises can affect certain special activities	None
People	Limited displacement of residents and businesses along the project alignment	The proponent has a policy to limit ROW acquisition to the minimum necessary level and to abide by the ROW Acqusition Law (RA 10572) and other pertinent laws	This is a residual project impact.
	Elevated infrastructure may cause overcrowding and airshed space	Design adjustments should be done to ensure that airshed space of neighboring entities is respected and to prevent diminution of values and opportunities of existing buildings specially in narrow roads	This will be a residual project impact in alignments where road right of way is narrow.
	The proposed project will have a huge potential for job creation and will require the services of various types of professionals and workers	Proponent should have prior coordination with the host LGUs to ensure that a certain percentage of the workforce from host areas will be employed during construction and operation	None
	Traffic congestion will occur in active construction areas	Careful planning and implementation of rerouting schemes and traffic management including early installation of traffic signages and multi media announcements of construction schedules, road closures and alternative routes	None
Operation			
Land use and classification	Commercial and residential development will occur in undeveloped areas near the proposed LRT 6 stations	Project alignment should be communicated to host LGUs so that the project can be incorporated in the local land use and development plans.	None
Terrestrial Ecology	Revegetation of cleared out areas along the project alignment will improve aesthetic value and enhance its ecology	Planting materials should be bird-diversity related such as anabiong, balete, sampalok and other native/endemic plants	None
	Introduction of invasive exotic species for landscaping may negatively impact local biodiversity	Revegetation will be done with minimal use of exotic plants; nursery raised seedlings collection from the site will be used instead	None
	Collision of terrestrial wildlife with railway components	Personnel should be informed about policies and actions required to apply on injured terrestrial fauna. All incidents should be reported to DENR. Bird strike data should be assessed to determine points of collision and areas of high collision incidence	None
Air Quality and Noise	Noise will be generated during the passage of trains and impact will be significant in areas with sensitive receptors such as schools and hospitals	• Increase distance between noise source and receiver • Install noise barriers between noise source and receiver to interrupt the path of the noise • Incorporate noise criteria in specifications and selection of equipment	None

Environmental Component	Potential Impact	Mitigation/Enhancement Measures	Residual Impacts
People	Operation of the railway infrastructure will make social services such as housing facilities, health care and educational opportunities more accessible to host and neighboring LGUs	Regular and proper maintenance of railway project to ensure constinuous and uninterrupted service to railway users.	None
	Huge infrastructures and electronically-run systems can pose risks to public safety	Provision of adequate lighting, clear signages, functional security surveillance systems and assignment of adequate number of security personnel in entrance/exit points and in the platforms	None
	Operation of micro-businesses in the LRT stations can create jobs for local residents	Provision of space for micro-businesses should be incorporated in the design of the LRT 6 stations	None
	The project can boost tourism in the host cities	Proper and regular maintenance of the railway project will increase its positive impact to the users.	None

1.3.3 Risks and uncertainties relating to the findings and implications for decision making

The proposed project has very few residual impacts that are expected to persist even with the implementation of recommended mitigating measures. These include the impacts to residents and business owners along the project alignment whose properties will need to be acquired for the project's ROW as well as the potential overcrowding and loss of airshed space in roads with narrow ROWs. The proponent will aim to minimize and limit ROW acquisition and if ROW acquisition is inevitable, affected properties will be acquired following local and international guidelines on ROW acquisition. The proponent is expected to acquire affected properties using fair market values.

Seismic and other natural hazards are expected to persist with or without the project implementation. The existence of these hazards, particularly liquefaction, ground shaking and tsunami should be considered in the project design.

2 PROJECT DESCRIPTION

2.1 Project Location and Area

The proposed Project will traverse the cities of Parañaque, Las Piñas and Muntinlupa in southern Metro Manila and the cities of Bacoor and Dasmariñas in Cavite Province. The location of the project alignments is shown in **Figure 2-1** and described in succeeding sections.

Figure 2-1. Location map of LRT Line-6 A and Line-6 B+C (Modified LRT Line 6 FS, 2017)

2.1.1 Location of LRT Line-6A

The LRT Line-6A alignment will traverse Molino Boulevard (officially named Bacoor Boulevard) and Molino Road in Bacoor City and Paliparan Road in Dasmariñas City in a north-southeast direction. LRT Line-6A will commence at Niog Station in Barangay Niog 3, Bacoor City and will traverse south-southwestward along Molino Boulevard. The alignment will then turn east at Barangay Bayanan, and then south at Barangay San Nicolas, then west at Barangay Molino 6 passing through privately-controlled properties. From Barangay Molino 2 where the San Nicolas Station will be located, the LRT Line-6A alignment will head southward along Molino Road. Just before the Daang Hari Station, the LRT Line-6A alignment will head east-southeast, passing through privately-controlled properties located in Barangays Molino 3 and Molino 4 of Bacoor City and Barangay Salawag of Dasmariñas City. Daang Hari, Alabang and San Pedro Stations will be located in these areas. From San Pedro Station, the LRT Line-6A alignment will head southwest, then the alignment will follow the alignment of Paliparan Road until its intersection with Governor's Drive passing through Barangays Paliparan 3, Paliparan 2 and Paliparan 1 of Dasmariñas City. LRT Line-6A will be elevated except for the sections between Daang Hari and San Pedro Stations within privately controlled properties where the structure will be on embankment.

The project alignment will pass through 12 barangays of Bacoor City and four barangays of Dasmarinas City. **Table 2-1** lists the stations of LRT Line-6A and barangays traversed by the alignment.

Table 2-1. Barangay location of the LRT Line-6A Alignment.

City	Impact Barangays			
Bacoor City	Talaba 4 Niog 3 / Bayanan Ligas 2	Ligas 3 San Nicolas 1 San Nicolas 2	San Nicolas 3 Molino 1/Burol Molino 2	Molino 3 Molino 4 Molino 6
Dasmariñas City	Salawag	Paliparan 1	Paliparan 2	Paliparan 3

Stations	Description	Barangay Location
Niog	Near corner of Molino Boulevard and Aguinaldo Highway	Niog 3
Bacoor City Hall	General vicinity of Vista Mall North	Bayanan
San Nicolas	Along Molino Road before intersection with Molino Boulevard	Molino 2
Daang Hari	General vicinity of Vista Mall Daang Hari	Molino 4
Alabang	Within private properties in Barangay Molino 4	Molino 4
San Pedro	Within private properties in Barangay Salawag	Salawag
La Salle	Near boundary of Barangays Salawag and Paliparan III	Salawag
GMA	Near boundary of Barangays Paliparan III and Paliparan II	Paliparan 3
Governor's Drive	Near intersection of Paliparan Road and Governor's Drive	Paliparan 1

2.1.2 Location of LRT Line-6B

The LRT Line-6B (Cavite Line) alignment will traverse Dr. Arcadio Santos Avenue and Angelina Canaynay Avenue in Parañaque City and CAA Road and Marcos Alvarez Avenue in Las Piñas City. It will commence at the NAIA Terminal 1/Terminal 2 Station which will be a single-track commuter rail towards NAIA 1 from Sucat Station in Parañaque City. From Sucat Station, LRT Line-6B will traverse Dr. Arcadio Santos Avenue towards the southeast. From Canaynay Station along Dr. Arcadio Santos Avenue, the alignment will turn right at Angelina Canaynay Avenue and head towards the southwest. The alignment will then traverse Angelina Canaynay Avenue and will turn southwest towards CAA Road. The alignment will then traverse CAA Road until it intersects Alabang-Zapote Road, after which the alignment will turn southeast and traverse the Alabang-Zapote Road. The LRT Line-6B alignment will turn southwest at Marcos Alvarez Avenue and will traverse this road until Marcos Alvarez Extension. The alignment will then head west, passing through privately-controlled properties until it intersects LRT Line-6A in the vicinity of Barangay Molino 6, Bacoor City. LRT Line-6B will be an elevated structure. The stations and barangay location of LRT Line-6B are tabulated in **Table 2-2**.

Table 2-2. Barangay location of the LRT Line-6B Alignment.

City	Impact Barangays			
Parañaque City	Sto. Niño	La Huerta	San Dionisio	
Las Piñas City	Manuyo Dos Pulang Lupa Dos	Pamplona Tres BF International	Talon Uno Talon Dos	Talon Singko
Bacoor City	San Nicolas 3	Molino 6	Molino 2	
Stations	**Description**			**Barangay Location**
NAIA T1/T2	Near NAIA Terminal 1			Sto. Niño
Sucat	Near SM Sucat			San Dionisio
Canaynay	Before intersection of Dr. A. Santos Ave. and A. Canaynay Ave.			San Dionisio
Naga	Along CAA Road near intersection with Naga Road			Pulang Lupa Dos/ BF International
Alabang-Zapote	Along CAA Road before intersection with Alabang-Zapote Road			Pamplona Tres
Marcos- Alvarez	Alabang-Zapote Road near intersection with Marcos Alvarez Ave.			Talon Uno
Apollo	Along Marcos Alvarez Ave. near intersection with Apollo Road			Talon Uno
Queen's Row	Marcos Alvarez Ave. before intersection with San Gregorio Street			Talon Singko
San Nicolas	Along Molino Road before intersection with Molino Boulevard			Molino 2

2.1.3 Location of LRT Line-6C

The LRT Line-6C (Sucat Line) alignment will commence at Sucat Station in Barangay San Dionisio, Parañaque City. This will be a common station for LRT Line-6B and LRT Line-6C and will traverse Dr. Arcadio Santos Avenue in a west-southwest direction towards Lake Front in Barangay Sucat, Muntinlupa City. LRT Line-6C will be an elevated structure that will pass through four barangays of Parañaque City and one barangay of Muntinlupa City. **Table 2-3** shows the barangay location of the alignment.

Table 2-3. Barangay location of the LRT Line-6C Alignment.

City	Impact Barangays			
Parañaque City	San Dionisio	San Isidro	San Antonio	BF Homes
Muntinlupa City	Sucat			
Stations	**Description**			**Barangay Location**
Sucat	General vicinity of SM Sucat			San Dionisio
Canaynay	Along Dr. A. Santos Ave. before intersection with A. Canaynay Ave.			San Dionisio
El Grande	Along Dr. A. Santos Ave. before intersection with El Grande Ave.			San Isidro
San Antonio	Along Dr. A. Santos Ave. before intersection with San Antonio Ave.			San Antonio
St. James	General vicinity of SM BF Parañaque			San Antonio / BF Homes
Lake Front	Along Meralco Road east of the Sucat Interchange			Sucat

2.1.4 Location of Alabang-Zapote LRT Line

The Alabang-Zapote LRT Line will traverse Alabang-Zapote Road. It will commence from Marcos Alvarez Station of LRT Line-6B and will head east until it terminates at the Star Mall Station along the Manila South Road located east of the Alabang Viaduct. This alignment will be an elevated structure that will pass through barangays of Las Piñas City and Muntinlupa City. **Table 2-4** lists the barangays along the alignment of the Alabang-Zapote LRT Line.

Table 2-4. Barangay location of the Alabang-Zapote LRT Line.

City	Impact Barangays		
Las Piñas City	Talon Uno	Almanza Uno	
Muntinlupa City	Ayala Alabang	Alabang	Cupang
Stations	**Description**		**Barangay Location**
Marcos Alvarez	Alabang-Zapote Road near intersection with Marcos Alvarez Ave.		Talon Uno
Town Center	General vicinity of SM Southmall		Almanza Uno
Madrigal	General vicinity of Madrigal Business Park		Cupang/Ayala Alabang
Star Mall	General vicinity of Star Mall Alabang		Alabang

2.1.5 Delineation of Primary and Secondary Impact Areas

The Project alignments will mostly pass through existing roads located in highly urban areas, except in sections where the alignment will pass through privately controlled properties. The roads traversed by the project alignments are lined by small, medium-sized and large commercial establishments as well as some institutional areas.

The primary or direct impact areas (DIA) of the Project has been designated as 100 m from the road centerline of the existing roads traversed by the Project alignments. These roads are tabulated in **Table 2-5**. The primary impact areas will include the commercial and institutional areas located along the roadsides as well as the adjoining residential, commercial and open spaces.

Table 2-5. Roads traversed by the Project Alignments.

Project Alignment	Road Name	Typical Road Width (m)
LRT Line-6A	Molino Boulevard Molino Road Molino Paliparan Road	14-18 14-18 14-18
LRT Line-6B	Dr. A. Santos Avenue A. Canaynay Avenue CAA Road Alabang Zapote Road Marcos Alvarez Ave. Marcos Alvarez Ave. Extension	32-33 14-18 14-18 17-20 14 11-13
LRT Line-6C	Dr. A. Santos Avenue Meralco Road	32-33 12
Alabang-Zapote LRT Line	Alabang Zapote Road	17-20

The DIA is expected to experience the following project impacts during the construction phase:

- Removal of vegetation cover and/or structures to make way for project facilities
- Increased noise and vibration levels due to noisy construction and pile driving activities
- Air quality impacts such as increased levels of dust and gaseous emissions
- Traffic congestion particularly in active construction areas
- Hindrance to property access and disturbance to economic activities near active construction sites
- Right of way acquisition of existing properties/structures that will be affected by the project alignment
- Impact to utilities and other public services

During the operation phase, the DIA is expected to experience the following project impacts:

- Possible noise and vibration impacts due to train operation
- Potential for further economic development of areas along the project alignment, particularly near the proposed stations
- Faster travel time for train users

The secondary or indirect impact area (IIA) has been delineated as 500m from the road centerline of existing roads traversed by the Project alignments. This will include the various land uses located within these areas, such as residential, commercial and institutional land uses as well as undeveloped private properties that are presently covered by grassland or similar land uses.

The IIA will experience limited project impacts during the construction phase. The most significant impact will be the possible obstruction to the access to subdivisions and/or large institutions such as schools and hospitals.

During project operation, the IIA as well as the rest of the host citiies will have access to a faster mode of travel from Cavite and Southern Metro Manila to the northern part of Metro Manila through the modal link with LRT Line-1 Extension.

Figure 2-2 shows the location of the primary and secondary impact areas of the project alignments.

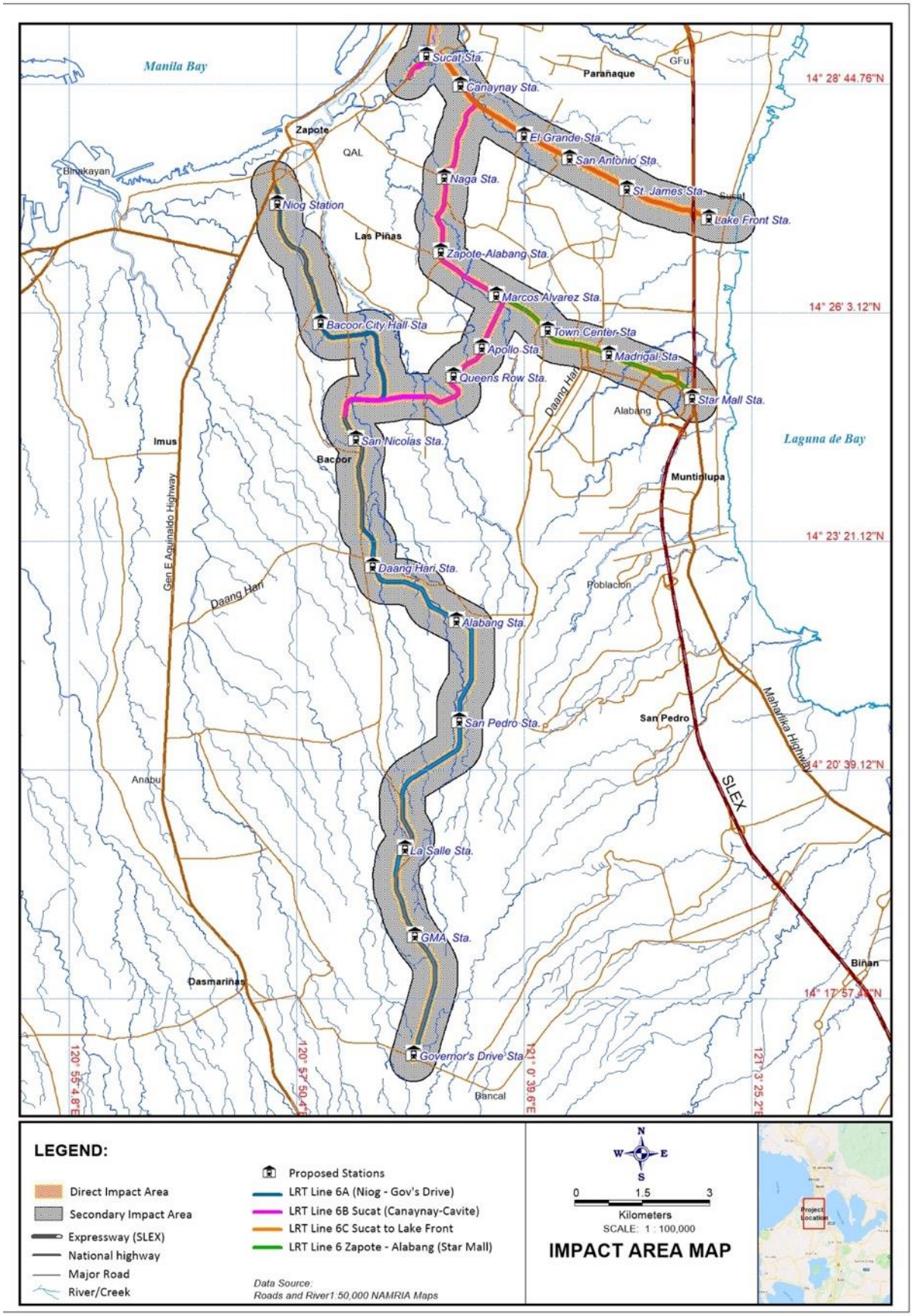


Figure 2-2. Location of Primary and Secondary Impact Areas.

2.2 Project Rationale

Southern Metro Manila and Cavite Province are fast developing areas that host industrial and technology parks, several large commercial establishments, as well as numerous residential subdivisions. Due to its proximity to Metro Manila, the province of Cavite has become a primary destination for real estate investment. Consequently, the population of Cavite province has been increasing through in-migration of Metro Manila employees who chose to reside in the various subdivisions developed in the province. This trend is expected to continue in the coming years as more residential subdivisions are being constructed in the province. Subsequently, more commercial areas are being developed to cater to the needs of the increasing population. This has led to higher demand for public transportation services as well as congestion of roads with the continuous increase in number of public and private vehicles making daily trips between Metro Manila and Cavite Province.

The existing roads in Southern Metro Manila and Cavite are now congested and the traffic situation is expected to worsen as population continues to grow. With the congested roads, people find it hard to predict travel time to their intended destination. This translates to lost opportunities for the commuting public as well as loss in business income.

The proposed Project aims to provide a new public transportation infrastructure from Metro Manila to Cavite Province to serve the developing areas of Parañaque, Las Piñas and Muntinlupa in Metro Manila and Bacoor and Dasmariñas in Cavite Province. Residents from these areas commute to Metro Manila regularly for work and other business.

The proposed Project further aims to extend the LRT Line-1 Extension alignment from the Niog Station in Bacoor City down to Governor's Drive in Dasmarinas City along Molino/Paliparan Road and adjacent areas.

The main project objectives are to provide a convenient and affordable mass transit system for Cavite Province and adjacent cities and create business and employment opportunities for communities and business establishments located within these areas.

The proposed project supports the Build, Build, Build Program of the Duterte Administration and is envisioned to link to the existing urban rail transport systems in Metro Manila.

2.2.1 Metro Manila LRT Development Plans

Metro Manila has three existing urban rail transport systems that serve about 6% of total person trips in the metropolis (Modified LRT 6 FS, 2017). These are:

- LRT Line 1 with 20 stations and route length of 20.7 km from Pasay City (Baclaran Station) to Caloocan City (Monumento Station) and was later extended to Quezon City (Roosevelt Avenue Station) under the LRT 1 North Extension Project;
- LRT Line 2 with 11 stations and route length of 13.8 km from Pasig City (Santolan Station) to Manila (Recto Station); and
- MRT Line 3 with 13 stations and route length of 16.9 km from Quezon City (North Avenue Station) to Pasay City (Taft Avenue Station).

LRT Line 1 is the first metro line of the Metro Manila Light Rail Transit System that started operating in 1984. It runs in a generally north-south direction from Baclaran to Monumento following the Rizal Avenue-Taft Avenue alignment and in an east-west direction from Monumento to North Avenue following the alignment of Epifanio de los Santos Avenue (EDSA). The line links the cities of Quezon, Caloocan, Manila, Pasay and Parañaque. It is connected to LRT Line 2 through the Doroteo Jose Station and to MRT Line 3 at the EDSA Station. A future link to MRT Line 3 is located at the North Avenue Station once this section is completed and becomes operational. The line serves from 300,000 to 500,000 passengers daily and is presently operated via a concession agreement with DOTr by the Light Rail Manila Corporation (LRMC), a joint venture of Metro Pacific Light Rail Corporation, AC

Infrastructure Holdings Corporation, and Macquarie Infrastructure Holdings (Philippines) PTE Ltd. A plan to extend the LRT Line 1 from Baclaran to Bacoor has been approved but construction has not started as of April 2019.

LRT Line 2 is a Metro Manila rapid transit line that runs in an east-west direction along Radial Road 6 (Legarda Street-Magsaysay Boulevard-Aurora Boulevard-Marikina-Infanta Highway) and a portion of Circumferential Road 1 (Recto Avenue). The line is operated by the Light Rail Transit Authority, a public transport operator organized as a government owned and controlled corporation under the Department of Transportation. The line started operation in 2003 and serves close to 200,000 passengers daily. Total ridership of this line is significantly below its built maximum capacity. Transfer to LRT Line 1 is possible at Doroteo Jose Station and to MRT Line 3 at Cubao Station.

MRT Line 3 is a Metro Manila rapid transit system that runs in an orbital north to south route following the alignment of EDSA. The line started full operation in 2000 and is operated by the Metro Rail Transit Corporation, a private company operating in partnership with the Department of Transportation under a Build-Lease-Transfer agreement. MRT Line 3 serves close to 550,000 passengers daily and is the busiest among the three rapid transit lines of Metro Manila.

A new urban rail line called MRT Line 7 is currently being constructed by SMC Mass Rail Transit 7 Incorporated via PPP. This line will connect the North Avenue common station in Quezon City to San Jose del Monte City in Bulacan Province. MRT Line 7 will be 23 km long and will have 14 stations traversing Quezon City and Caloocan City in Metro Manila with the intermodal terminal station located in San Jose del Monte, Bulacan. The line aims to decongest the Commonwealth Avenue area and shorten travel time for residents of Quezon City, Caloocan City and neighboring areas.

A common station is now being constructed at the corner of North Avenue and EDSA to link LRT 1 North Extension with MRT Line 3. MRT Line 7 will be connected to the LRT Line 1 and MRT Line 3 platforms through a second level walkway.

The schematic diagram of the operational rail transport systems is presented in **Figure 2-3** below.

Figure 2-3. Schematic Diagram of Metro Manila Railway Systems (Source: Wikipedia).

Aside from the three urban rapid transport systems in Metro Manila, the Philippine National Railways (PNR) has been operating the PNR Metro South Commuter Line since 1970, a commuter rail running from Tutuban in the City of Manila to Alabang in Muntinlupa City. The line runs in a north-south direction with 17 stations passing through the cities of Manila, Makati, Taguig, Parañaque and Muntinlupa. Passengers on this line can transfer to LRT Line 1 at Blumentritt Station, to LRT Line 2 at Santa Mesa Station, and to MRT Line 3 at EDSA Station. The Sucat and Alabang Stations of PNR Metro South Commuter Line will be in the vicinity of the eastern endpoints of LRT Line-6C and Alabang-Zapote LRT Lines, respectively.

2.2.2 Vehicular and Passenger Traffic Flows at the LRT 6 Corridor

Traffic surveys were conducted on March 2017 for the feasibility study of the Modified LRT 6 project to determine the existing vehicular and passenger traffic flow along the proposed routes of LRT Line 6 along Aguinaldo Highway and Molino Boulevard-Molino Paliparan Road. The traffic survey indicates that more vehicles pass through Molino Road compared to Aguinaldo Highway particularly at the intersections of Molino Boulevard (officially named as Bacoor Boulevard) with GSIS Road and Daang Hari (**Table 2-6**).

Table 2-6. Daily Vehicular Traffic Recorded during the March 2017 Traffic Survey (Modified LRT 6 FS, 2017)

Road Section (Aguinaldo Highway)	Northbound	Southbound	Total
Tirona Highway – Palico Daanan	16,317	20,618	36,935
Palico Daanan – Daang Hari	18,970	19,754	38,724
Aguinaldo – Governor's Drive	15,232	20,215	35,447
Road Section (Molino Road)	**Northbound**	**Southbound**	**Total**
GSIS Road – Molino Boulevard	20,047	20,021	40,068
Molino Boulevard – Daang Hari	24,175	23,737	47,912
Molino-Paliparan – Governor's Drive	15,950	12,748	28,698

Most of the vehicles recorded during the traffic survey in both Aguinaldo Highway and Molino Road are private vehicles and motorcycles/tricycles constituting an average of 43% and 26%, respectively of recorded vehicles in Aguinaldo Highway and 42% and 33%, respectively of recorded vehicles in Molino Road. Jeepneys represented 18% of recorded vehicles in Aguinaldo Highway and 15% of recorded vehicles in Molino Road. Public utility vans (PUVs) represented 1% of a total number of vehicles recorded in Aguinaldo Highway and Molino Road. Buses represented 6% of recorded vehicles in Aguinaldo Highway but less than 1% of recorded vehicles in Molino Road, indicating the lack of a regular bus route on Molino Road. Trucks represented 6% on Aguinaldo Highway and 5% on Molino Road. The average percentage composition of vehicles recorded during the March 2017 traffic survey in Aguinaldo Highway and Molino Road is presented in **Table 2-7**.

Table 2-7. Average Percentage Composition of Vehicles Recorded during the Traffic Survey (Modified LRT 6 FS, 2017).

Road Section (Aguinaldo Highway)	PRV	PUJ	AUV	PUB	TRK	MC-TC
Tirona Highway – Palico Daanan	36	18	2	7	4	32
Palico Daanan – Daang Hari	45	15	1	6	6	26
Aguinaldo – Governor's Drive	47	20	0	6	7	19
Average	43	18	1	6	6	26
Road Section (Molino Road)						
GSIS Road – Molino Boulevard	51	13	2	0.07	4	30
Molino Boulevard – Daang Hari	45	15	3	0.06	3	35
Molino-Paliparan – Governor's Drive	30	7	0	0.13	5	57
Average	42	15	1	3	5	33

In terms of passenger traffic, more passengers were recorded in Aguinaldo Highway compared to Molino Road indicating the higher number of public transportation modes available in this road (**Table 2-8**). The highest number of passengers recorded along Aguinaldo Highway is at the intersection of Tirona Highway and Palico Daanan while

the highest passenger traffic along Molino Road was recorded at the intersection of Molino Boulevard and Daang Hari.

Table 2-8. Daily Passenger Traffic Recorded during the March 2017 Traffic Survey (Modified LRT 6 FS, 2017)

Road Section (Aguinaldo Highway)	Northbound	Southbound	Total
Tirona Highway – Palico Daanan	100,429	77,638	178,067
Palico Daanan – Daang Hari	96,322	72,623	168,945
Aguinaldo – Governor's Drive	92,056	80,297	172,353
Road Section (Molino Road)	**Northbound**	**Southbound**	**Total**
GSIS Road – Molino Boulevard	45,324	52,162	97,486
Molino Boulevard – Daang Hari	57,633	50,569	108,202
Molino-Paliparan – Governor's Drive	13,394	17,625	31,019

2.2.3 Profile and Travel Patterns of Potential LRT-6 Riders

An interview with 598 public and private transport passengers along Aguinaldo Highway and Molino Road was conducted on March 2017 (Modified LRT 6 FS, 2017). The survey indicated the following results:

- About 57% of the survey respondents use public transportation while the remaining 43% use private vehicles
- 83.4% are gainfully employed as professionals or ordinary workers while 9.5% are students
- The average income of gainfully employed survey respondents is Php14,200 per month, which is higher than the regional minimum wage
- About 45% of the daily trips are work-related
- The survey respondents spend an average of Php155 per one-way trip
- About 79% of the private vehicle users and 91.5% of public transport riders indicated a willingness to shift to LRT 6 when this becomes operational
- The preferred fare has an average of Php23 per trip

2.3 Project Alternatives

2.3.1 Criteria used in determining options for facility siting, development design, and resource utilization

2.3.1.1 Siting

The LRT 6 project was originally intended as the Phase 2 of the LRT-1 South Extension from Niog Station to Dasmariñas City passing through the Aguinaldo Highway. The proposed LRT Line-6A is the Phase 1 of the Modified LRT 6 project and aims to lengthen the LRT-1 Extension from Niog Station to Governor's Drive passing through Bacoor Boulevard, Molino-Paliparan Road and on private lands located east of Molino Road. Phase 2 of the Modified LRT Line-6A project will extend the railway system from Governor's Drive to Tagaytay. The alternative route alignment of LRT Line-6A that will pass through Molino-Paliparan Road instead of Aguinaldo Highway will provide wider space for construction compared to the limited space along the Aguinaldo route due to the presence of 69kV transmission lines that will create an obstacle when using cranes during the erection of prefabricated I-girders. Relocation of the transmission lines will increase the construction cost thus the new alignment of LRT Line-6A along Molino-Paliparan Road will reduce investment costs and shorten the construction period.

The Project will be located in Parañaque, Las Piñas and Muntinlupa Cities in Metro Manila and Bacoor and Dasmariñas Cities in Cavite Province. These areas are experiencing rapid development through the establishment of industrial parks and commercial centers as well as housing subdivisions. Most of the residents of these housing subdivisions commute to Metro Manila daily for work and other business.

The fast development and rapid population increase in these areas led to traffic congestion in major road networks. Southern Metro Manila is accessible through the Manila-Cavite Coastal Road and the South Luzon Expressway while Cavite province is accessible through major roads including Aguinaldo Boulevard (Manila-Cavite Coastal Road), South Luzon Expressway, Aguinaldo Highway, the Zapote-Las Piñas Road, Sta. Rosa-Tagaytay Road, and the Alabang-Molino via Daang Hari Road. Public transportation from Metro Manila is provided by buses and vans while in-city transportation is through jeepneys and tricycles.

2.3.1.1.1 Site Susceptibility to Natural Hazards

Metro Manila and Cavite Province along with the rest of the Philippine mobile belt are susceptible to seismic hazards such as ground shaking. The nearest seismic generator to the project site is the West Valley Fault. Movement of this fault, as well as other nearby seismic generators such as Manila Trench on the west and the Philippine Fault on the east is expected to result to ground shaking in the project site. The northern portions of Las Piñas, Parañaque and Bacoor and the lakeshore areas of Muntinlupa have moderate susceptibility to ground shaking hazards (Daligdig and Besana, 1993). The estimated peak ground acceleration for soft soils is 0.61 g, 0.39 g for medium soils, and 0.22 g for rock (Thenhaus, et al, 1990). The north-northwest segments of LRT Line-6A (Niog Station) and northwest and southeast segments of Line-6B+C (Sucat Station and Lakeshore Station, respectively) are located in areas underlain by soft to medium soils, thus higher peak ground acceleration is expected in these areas. These areas are also susceptible to liquefaction hazards.

The northern and central portions of Parañaque are susceptible to 2- to 10-year floods while the bay areas of Las Piñas, Parañaque, and Bacoor, as well as the lakeshore area of Muntinlupa, are susceptible to 50- to 100-year floods.

The project sites are located in flat areas that are not susceptible to landslides. The coastal areas of Las Piñas, Parañaque and Bacoor are susceptible to storm surges.

Metro Manila has a high susceptibility to typhoons/tropical cyclones and experiences at least two cyclones per year. The natural hazard susceptibility maps are presented in appropriate sections of the EIS (i.e., geology, climate, and meteorology).

2.3.1.1.2 Right of Way Issues

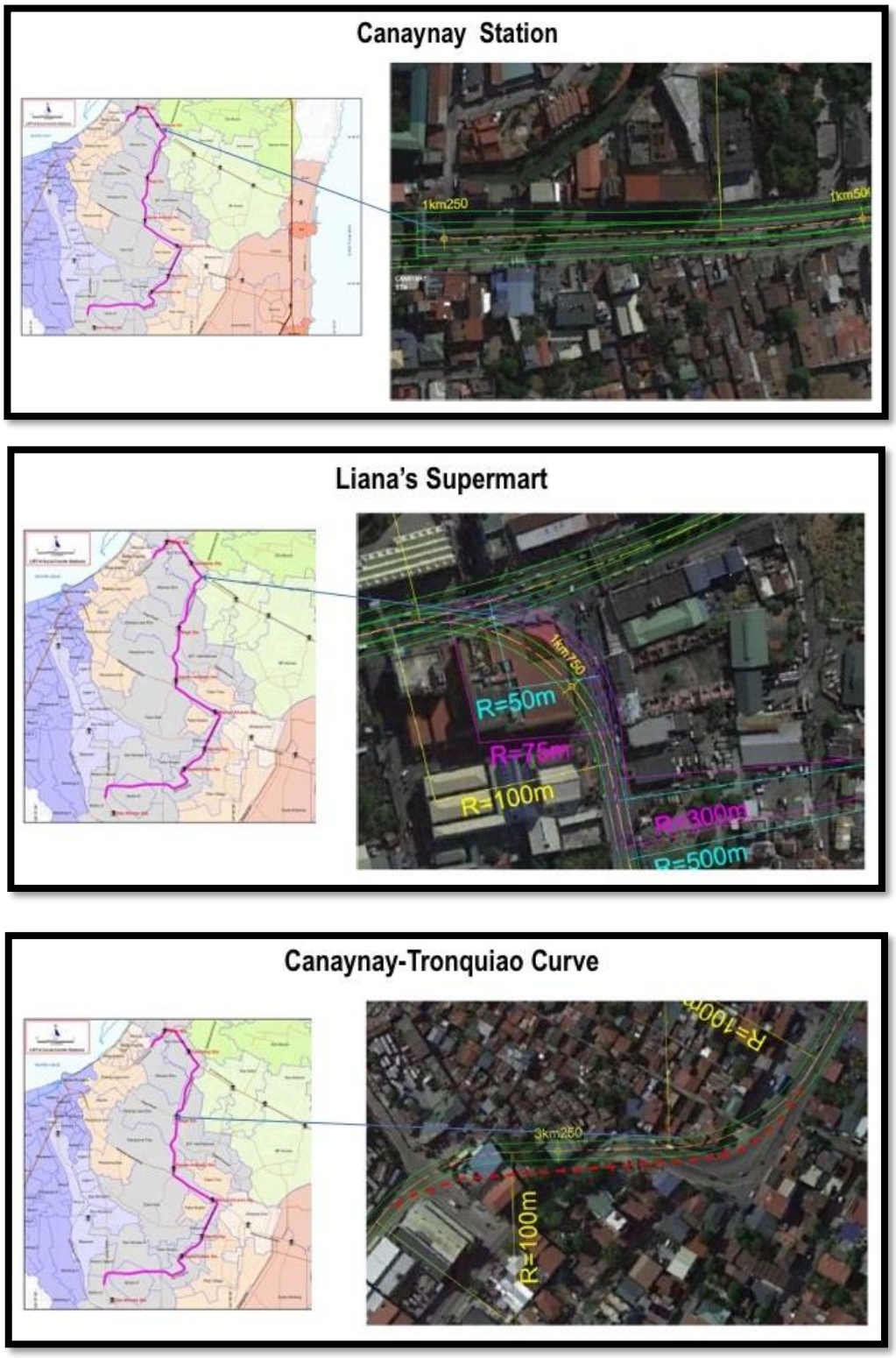
Right of way (ROW) issues were initially identified in some segments of the project alignments. Construction of the carriageway may encroach on some private properties particularly in areas with narrow road width.

Land acquisition is foreseen in areas along the LRT Line-6B+C alignment. Google Earth satellite images of these sections are presented in **Plate 2-1** while the list of project segments with ROW issues is presented in **Table 2-9**. It can be gleaned from **Table 2-9** that ROW issues are along the LRT Line-6B+C alignment in Parañaque & Las Piñas cities. Right of way in other project segments will be within privately controlled properties of the project proponent and its affiliated companies.

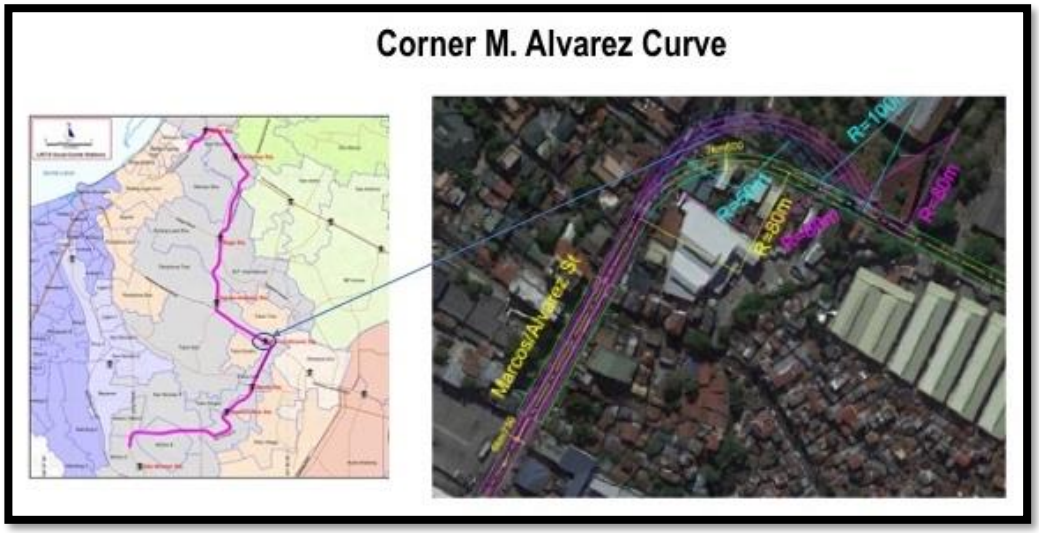
Table 2-9. Project Segments with ROW Issues (Modified LRT 6 FS, 2018).

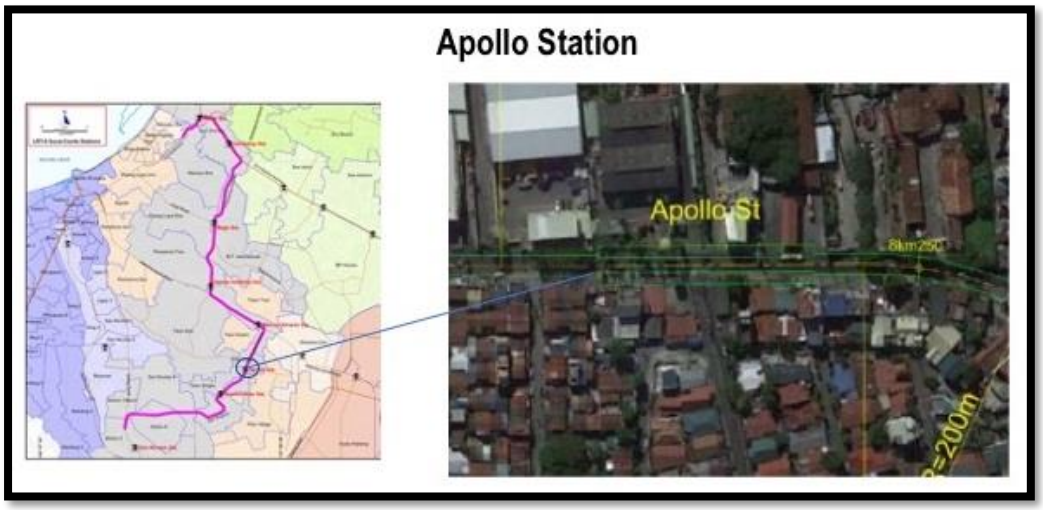
Location	Station Location	Length
Canaynay Station	Sta. 101+250	110 m
Liana's Supermart	Sta. 101+750	35 m
Canaynay-Tronquiao Curve	Sta. 103+250	60 m
Alabang Zapote Station	Sta. 105+250	110 m
Corner M. Alvarez Curve	Sta. 107+000	80 m
Apollo Station	Sta. 108+000	110 m
Queen's Row Station	Sta. 109+000	110 m
M. Alvarez Extension Curve-1	Sta. 109+250	80 m
M. Alvarez Extension Curve-2	Sta. 109+500	110 m
M. Alvarez Extension Curve-3	Sta. 110+000	50 m

Plate 2-1. Satellite images of LRT Line-6B+C segments with ROW issues.




Alabang-Zapote Station
Alabang Zapote St
5km250
Station Plaza

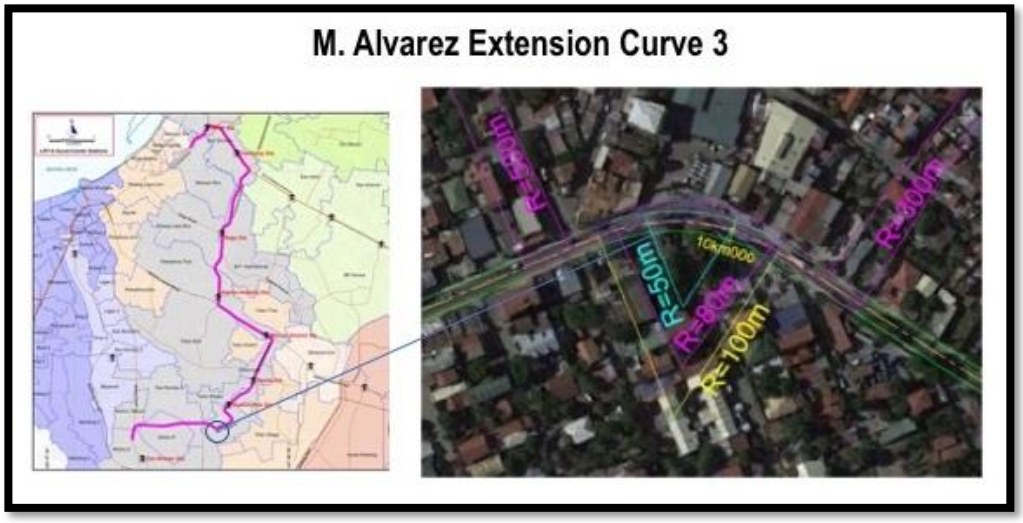

Corner M. Alvarez Curve
R=100m
R=80m
R=80m
R=80m
Marcos Alvarez St


Apollo Station
Apollo St
8km250
R=200m

Queen's Row Station

M. Alvarez Extension Curve 1

M. Alvarez Extension Curve 2



2.3.1.2 Technology Selection

2.3.1.2.1 Civil and Trackwork Design Guidelines

2.3.1.2.1.1 Alignment Design

The design of the horizontal and vertical alignments of the Project follows these basic policies:

- Select a route that will minimize land acquisition issues and impacts along the route
- Reduce initial investment costs and operation and maintenance costs
- Provide fast, convenient, safe and comfortable services to users
- Consider passenger transfer to other modes and connectivity to other railway lines

The major alignment design parameters are presented in **Table 2-10**.

Table 2-10. Alignment Design Specifications.

Items	Values/Specifications		
Track Gauge	Standard track gauge 1435mm		
Design speed	Maximum: 70km/h		
Main Line Track	Horizontal curvature-minimum radius	Main Line	More than 160m
		Stations	More than 400meter
	Length between transition curves	More than 30 meters	
Gradient	In Mainline	Absolute Max: 35 (Max. 40)/1,000	
		Station Max: 5/1,000	
	In Depot	Absolute Max: 5/1,000	
		Recommended: Level	
	In Stabling	Level	
Vertical curves	Minimum radius	More than 10/1,000 of gradient change Radius 3,000m (4,000m where horizontal curve radius is less than 800m)	
Track spacing	On Main Lines	3.2meter	
	At Stations	3.2meter	
	At Stabling	3.2 meter	
Formation width	Bridge & Viaduct: 2@2750mm+3.2000 mm		

2.3.1.2.1.2 Track Standards and Layout

The track design requirements are as follows:

Description	Requirements
Rail (Main Line):	EB 50T (50.1 Kg/meter)
Track Gauge:	1,435 mm
Min. track centre distance	3,200 mm
Max. Super elevation (Main Line)	150 mm
Height of platform from top of rails	690 mm
Minimum height of overhead power lines	4,300 mm

Preliminary studies indicate that the ballasted track type will be considered in the project since it will minimize initial investment costs. However, the final decision on selected track type will be done during the detailed design stage considering interest rates of financial institutions.

2.3.1.2.1.3 Civil Engineering Guidelines

The project design will be consistent with the latest version of the following international and Philippine standards:

- American Association of State Highway and Transportation Officials (AASHTO)
- American Concrete Institute Building Code Requirements for Structural Concrete (ACI-318)
- American Society for Testing and Materials (ASTM)
- Relevant standards of the Department of Public Works and Highways (DPWH)

The elevated structures will comply with the latest minimum vertical clearance requirement of DPWH. Elevated structures will have a vertical clearance of 6.5 to 7.2 m from the existing road surface while the embankment with retaining walls that will be adopted between 115+900 and 128+800 will be 2 to 7 m high (Modified LRT 6 FS, 2017).

The viaduct will consist of precast post-tensioned prestressed concrete I-girder with standard girder length of 30 m. The girders will be delivered onsite using low-bed trailers and will be erected using cranes.

The foundation will consist of a bored pile with pile cap. Drilling of bored piles will be done using high torque powered rotary drilling rigs. A steel rebar cage will be placed in the hole after completion of boring after which it will be casted with concrete.

2.3.1.2.2 Key Technical Issues

2.3.1.2.2.1 LRT Line-6B

For LRT Line-6B, interconnection with LRT Line 1 Extension is a key important issue that has been considered in the project design. Two options are being considered to interconnect with LRT 1 Extension: (1) construction of the Sucat Station close to SM Sucat and/or Dr. Santos Station of the LRT Line 1 Extension to facilitate passenger transfer; and (2) extend LRT Line-6B to NAIA and construct a station to provide transfer at NAIA Station of LRT Line 1 Extension.

Ownership of the Dr. Santos Station of LRT Line 1 Extension is also an issue that needs to be considered. This station that is located west of SM Sucat has planned intermodal facilities that will enable LRT passengers to transfer to other transport modes. If Sucat Station of LRT Line-6B+C will be located in this area, the project proponent will have to initiate talks with LRTA.

ROW issues along the alignment of LRT Line-6B+C have been adequately discussed in Section 2.3.1 (Siting). Negotiations with private land owners will be initiated prior to start of construction activities.

The NAIA Link of LRT Line-6B has to consider the obstacles limitation surfaces (OLS) imposed by NAIA which can impose restrictions on the alignment design. A comparative study of five alignment options has been done and results are presented in **Table 2-11** below.

Table 2-11. Comparative Study of NAIA Link (Modified LRT 6 FS, 2018).

Option	Connection with Line 1 Extension	R-o-W Issue	Route	Remarks
Option 1 Figure 5-6	Sucat Station to/from Dr. Santos Station	Sucat Station will occupy the station square of Dr. Santos Station of the Line 1 Extension planned by LRTA	The main line will be up to Sucat Station which is parallel to Dr. Santos Station. Construction of a branch line to NAIA T1/2, refer to the alignment of Option 4 or 5-A/B or provide a City Air Terminal (CAT) functions in the Dr. Santos station	Easy and convenient transfer between the two stations with 150-meter distance The lead tracks will be installed in the end point side of Sucat Station.
Option 2 Figure 5-7	Sucat Station to/from Dr. Santos Station	Sucat Station is planned outside of the station square of Line 1 Extension Dr. Santos station	The main line will be up to Sucat Station which is orthogonal to Dr. Santos Station. Construction of a branch line to NAIA T1/2, refer to the alignment of Option 4 or 5-A/B or provide a City Air Terminal (CAT) functions in the Dr. Santos station	The distance between two station is approximately 150 meters.
Option 3 Figure 5-8	1. Sucat Station to/from Dr. Santos Station 2. The new station between NAIA T1 and Sucat Station to/from NAIA Station of Line 1 Extension	Sucat Station is planned outside of the station square of Line 1 Extension Dr. Santos station	Sucat Station will be located on a curved section above Dr. Santos Road The route alignment will take along Ninoy Aquino Avenue or above the canal parallel to Line 1 Extension alignment	The terminal will be Sucat Station Single track operation between Sucat Station and NAIA Station
Option 4 Figure 5-9	1. Sucat Station to/from Dr. Santos Station or 2. New station between Sucat Station and NAIA T2 Station		Along Carlos P. Garcia Extension – Multi National Avenue - Ninoy Aquino Avenue to NAIA T1/2	Sucat Station will be near SM The separation distance between Sucat Station and DR. Santos Station is approximately 500 meters, while at NAIA Station of Line 1 Extension is 400 meters which is inconvenient for passenger transit
Option 5-A Figure 5-10	New station between Sucat Station and NAIA T2 Station		Along Carlos P. Garcia Extension – Multi National Avenue - Ninoy Aquino Avenue to NAIA T1/2 The new station between NAIA T1/2 and Sucat Station will be a new terminal	Sucat Station will be near SM The separation distance between Sucat Station and DR. Santos Station is approximately 500 meters, while 150 meter to/from NAIA Station of Line 1 Extension which is more convenient Airport link will be single track operation
Option 5-B Figure 5-11				

2.3.1.2.2.2 LRT Line-6C

The issue for LRT Line-6C is at the Sucat intersection where the Skyway flyover structures are located. LRT Line-6C will need to have an underpass structure beneath the Skyway flyover (**Plate 2-2**). Three options are being considered for the section of LRT Line-6C near the Skyway flyover structures: (1) truss bridge structure with span length of 70 m and main girder height of 9 m; (2) underground structure; and (3) detour route with truss bridge. Cost estimation for the feasibility study was made assuming the use of a 3-span truss bridge type.

Plate 2-2. Proposed alignment of LRT Line-6C at the Sucat Intersection (Modified LRT Line 6 FS, 2018).

There is no right of way acquisition issue for LRT Line-6C since the project alignment will follow the center alignment of Dr. A. Santos Avenue.

2.3.1.2.2.3 Canaynay Crossover Track

The Canaynay Station will be a transit station between LRT Line-6B and Line-6C with two platforms and four tracks. The east bound track of LRT Line-6C will crossover the LRT Line-6B track between Canaynay Station and El Grande Station, i.e. the line will be on third level (**Figure 2-4**).

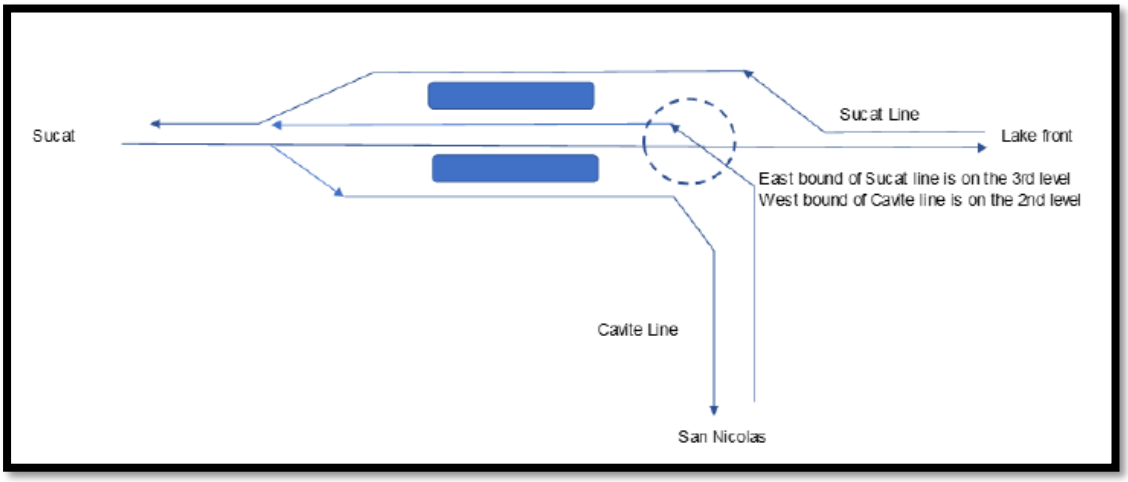


Figure 2-4. Platform and track layout of Canaynay Station (Modified LRT 6 FS, 2018).

2.3.1.3 Project Implementation Strategy

The provision of new and efficient public transportation infrastructure is necessary to sustain the development and economic growth of Metro Manila and nearby urban centers. However, the government is often constrained by budgetary restrictions. Republic Act No. 7718 or the Philippine Build-Operate-and-Transfer (BOT) Law provides the framework for public-private partnership (PPP) in infrastructure development. As provided in the BOT law and its amendment as well as its implementing rules and regulations, collaborative partnerships between the government and the private sector is possible through various modes.

Private sector involvement in transportation projects brings about the following benefits:

- Infrastructure projects created through PPP improves the quality and quantity of transportation
- Construction of infrastructure projects are completed according to plan and budget and repairs and maintenance are planned at the outset
- Early delivery of the project translates to the early delivery of wide social benefits
- The performance risk is transferred to the private sector, and since payment is not received until facility is available for use, the private sector is encouraged to complete the project on time and without defects

- The use of private funding in infrastructure projects enables the accelerated delivery of the project to the public without waiting years for the government to make funds available for the project
- The PPP process helps reduce government debt and frees up public capital that can be used for other necessary government services

The proposed Project is an unsolicited PPP proposal submitted to the DOTr on 13 January 2017. The proposal has been referred to NEDA for evaluation and approval. The PPP process is outlined in **Table 2-12**.

Table 2-12. The Process of the Unsolicited Proposal (Modified LRT-6 FS, 2017).

No.	Activity	Period under the BOT Law
1	To conduct Feasibility Study (FS) at no cost to the Government	N/A
2	Review of Submission of Proponent to DOTr to ensure completeness of proposal, Completion/Correction of Proposal, preparation of draft Concession Agreement	N/A
3	Submission of complete unsolicited proposal	N/A
4	Receipt of the Proponent's proposal shall be acknowledged	Within 7 calendar days from submission of proposal
5	The Proponent shall be advised on whether the proposal is complete or incomplete	Within 30 calendar days from submission of proposal
6	Evaluation and Acceptance of Proposal [Confirmation of the Proponent as "original proponent"]	Within 120 calendar days from receipt of complete proposal
7	Endorsement by DOTr of the Unsolicited Proposal to the ICC for determination of the reasonable rate of return ("ROR")	Within 5 calendar days upon issuance of the letter of acceptance by the DOTr
8	Determination by NEDA upon recommendation by the ICC of reasonable ROR and other parameters for negotiation	Within 30 days upon receipt of endorsement, results of due diligence evaluation conducted and submission of complete documentation from the DOTr
9	DOTr shall be formally advised by NEDA-ICC that the determination of the ROR and other parameters for negotiation is final and executory	After determination of ROR and other parameters for negotiation
10	The Proponent shall be informed in writing of the mechanics of the negotiation including the commencement date and the authorized representative(s) of the DOTr	Within 7 calendar days upon receipt of formal advise from NEDA that the determination of ROR and other parameters for negotiation is final and executory
11	Conclusion of negotiations [If the negotiation is successful, the DOTr and the Proponent shall issue a signed certification that an agreement has been reached by both parties]	Within 80 calendar days from receipt by the Proponent of written notice from DOTr to commence negotiation
12	Submission of report of the result of negotiation to the ICC and NEDA	Within 7 calendar days after the 80-day period
13	Issuance of opinion by OGCC/OSG/DOF on the draft contract	Within 10 days from receipt of draft contract as submitted by the DOTr

2.3.1.4 Resources

Power Supply

The project is expected to use generator sets during the construction phase. Power supply during the operation phase will come from service providers and will pass through energy supply substations to provide power to operating facilities, wayside equipment and passenger stations.

Water Supply

Water supply during the construction phase will be provided by water supply trucks while water supply for train stations during the operation phase will be provided by service providers (i.e., Maynilad, Manila Water).

2.3.2 Comparison of environmental impacts of each alternative

In general, operational light rail transit projects are viewed to have substantial environmental and social benefits, such as reduced air pollutants and greenhouse gas emissions, increased ridership, improved mobility and reduced travel times, job creation, and economic development particularly in areas near the LRT stations. However, negative environmental impacts during project construction can include permanent impacts such as vegetation removal or temporary impacts such as increased noise levels and vibration, visual and air quality impacts, impact to existing utility lines, soil and groundwater contamination. Noise and vibration impacts are expected to be limited to small sections along the project alignment where construction activities are ongoing.

The comparision of predicted environmental impacts of project alternatives are discussed below.

In terms of facility siting, the original alignment of LRT Line-6A along Aguinaldo Highway and the proposed alignment along Molino-Paliparan Road are both located on busy roads, with higher traffic volume on Molino Road compared to Aguinaldo Highway. Private vehicles (cars and motorcycles) represent more than 69% and 75% of the vehicles recorded in Aguinaldo Highway and Molino Road, respectively. Public modes of transportation (jeepneys, vans and buses) represent 25% and 19% of the total number of vehicles recorded at Aguinaldo Highway and Molino Road, respectively. It can be seen from traffic survey data that locating the LRT Line-6A alignment on Molino-Paliparan Road will benefit more private vehicle users and can potentially reduce a higher number of private vehicles on the road. This can in turn reduce the congestion of roads in Bacoor and Dasmariñas particularly during the morning and evening rush hours.

In terms of benefit to the commuting public, locating the alignment on Aguinaldo Highway will benefit more passengers as higher passenger traffic was recorded on Aguinaldo Highway compared to Molino Road. However, these passengers will have the option of riding the LRT 6 (located on Molino Road) to Metro Manila particularly if intermodal transfers will be available at the train stations.

The alignment of LRT Line-6B will traverse narrow roads with widths ranging from 11 to 20 m. This will necessitate the acquisition of ROW particularly in curved sections.

The alignment of LRT Line-6C and the Alabang-Zapote Line are located on wider roads, 32 to 33 m at Dr. Santos Avenue and 17 to 20 m at Alabang-Zapote Road, which can accommodate the required ROW for the LRT 6 alignment.

The alignment design as well as the track standards and layout already selected the route that will minimize ROW acquisition issues and impacts along the alignment. The choice between ballasted and ballast-less track types was also made considering the initial investment cost and operation and maintenance costs.

2.3.3 Consequences of not proceeding with the project

The no project alternative will imply that residents of southern Metro Manila and nearby cities of Cavite Province will continue to use existing transport modes and experience heavy traffic conditions on existing roads.

2.4 Project Components

The alignments of the four LRT 6 segments are shown in **Figures 2-5** to **2-8**. The LRT Line 6A (**Figure 2-5**) will follow the centerline alignment of Bacoor Boulevard from Niog Station, then it will pass through private properties in the vicinity of Bacoor City Hall. The alignment will emerge in Molino Road and will follow its centerline alignment before turning east into private properties at the intersection with Daang Hari. The alignment will re-emerge at

Paliparan Road in Barangay Salawag, then will follow its centerline alignment until the intersection with Governor's Drive.

The alignments of LRT Line-6B+C and the Alabang Zapote Line will follow the centerline alignment of existing roads.

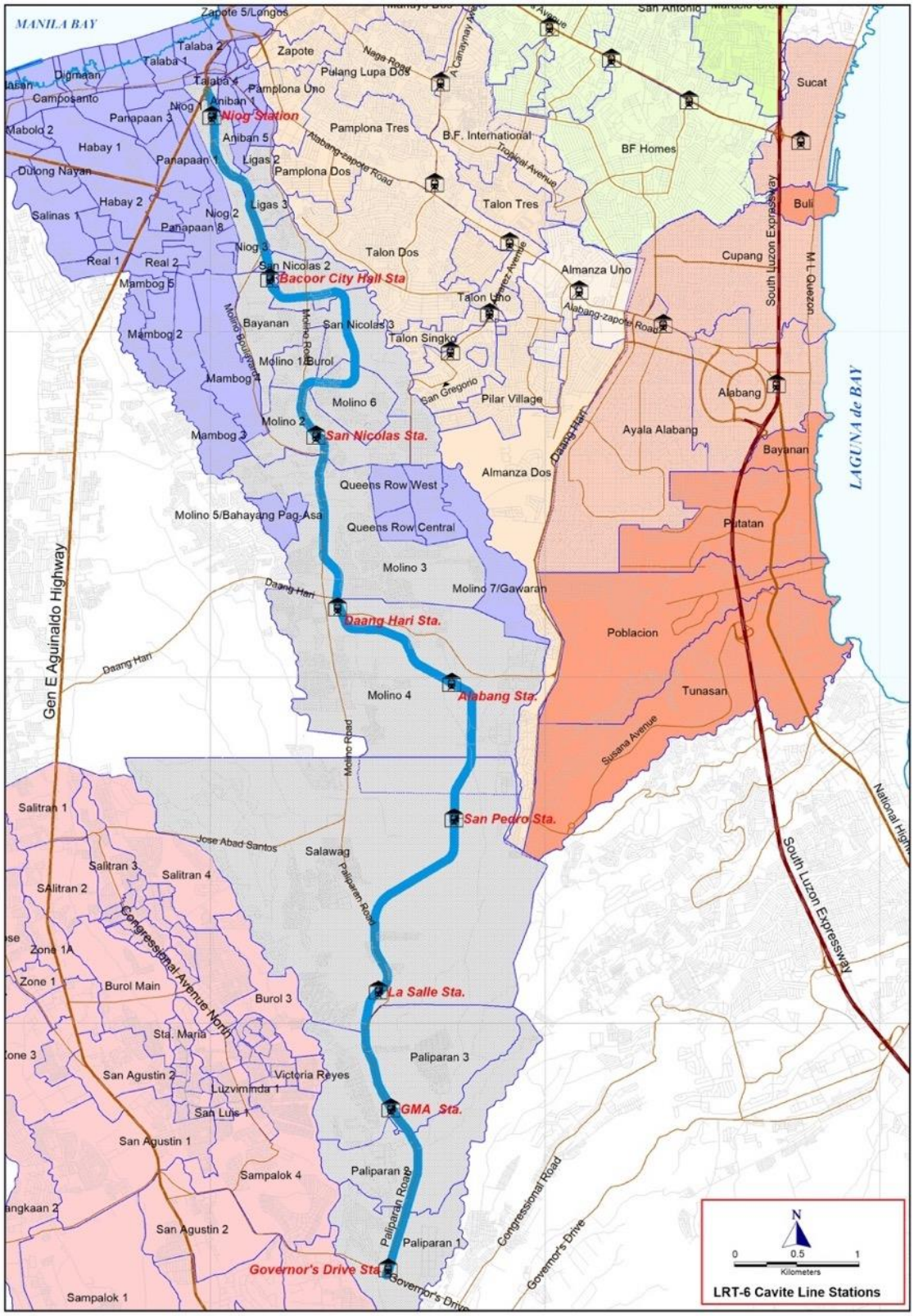


Figure 2-5. Alignment of LRT Line-6A

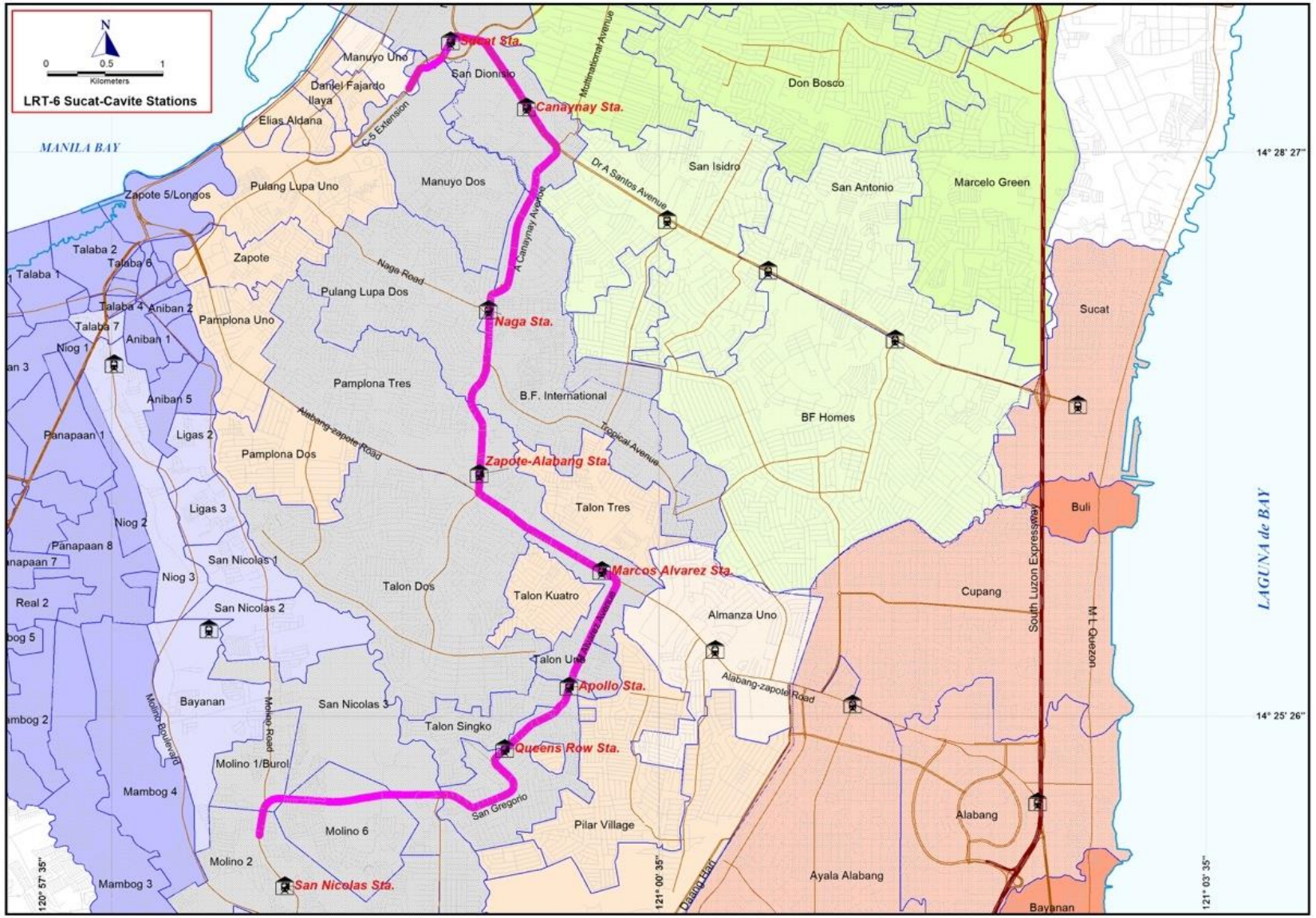


Figure 2-6. Alignment of LRT Line-6B.

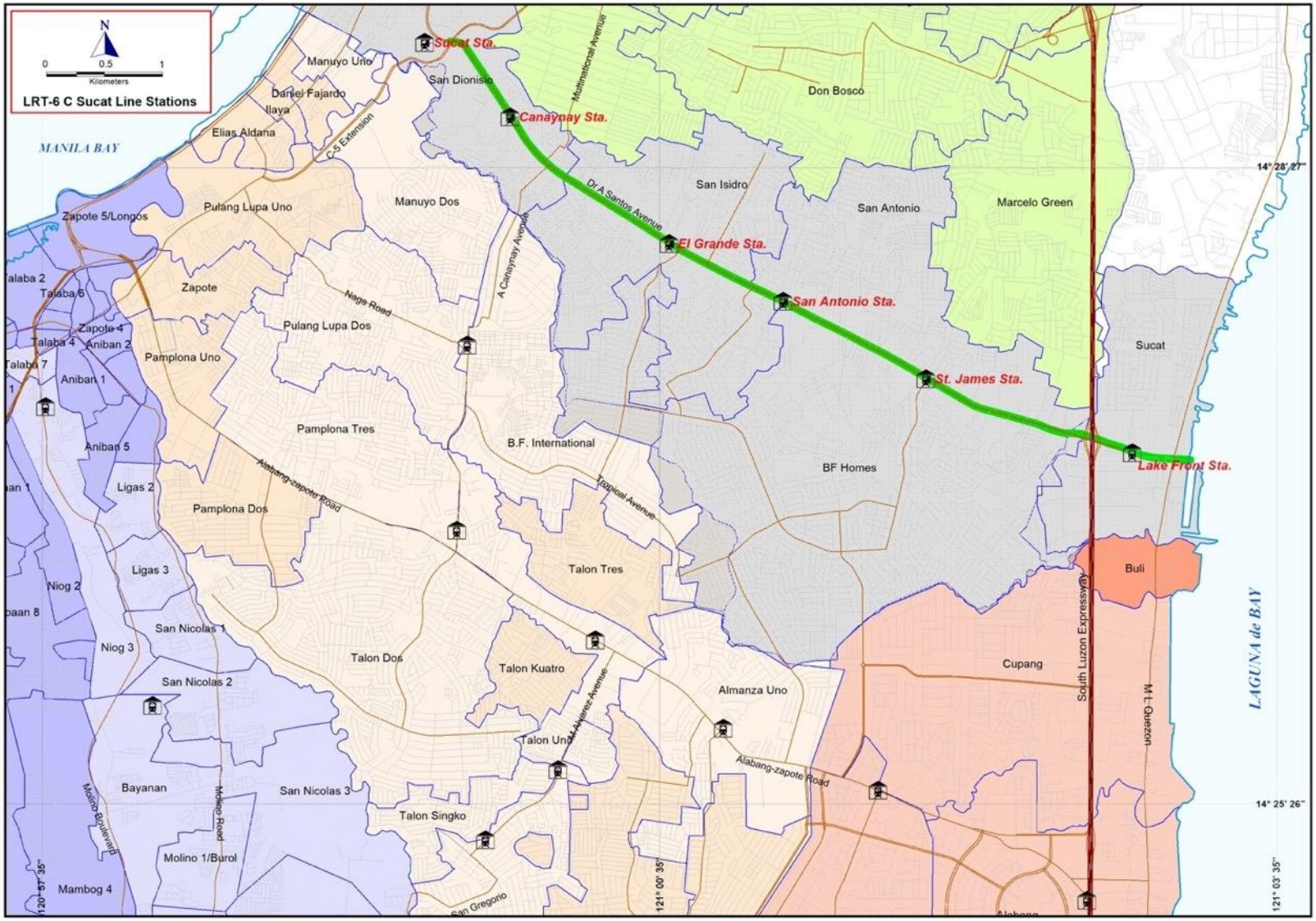


Figure 2-7. Alignment of LRT Line-6C.

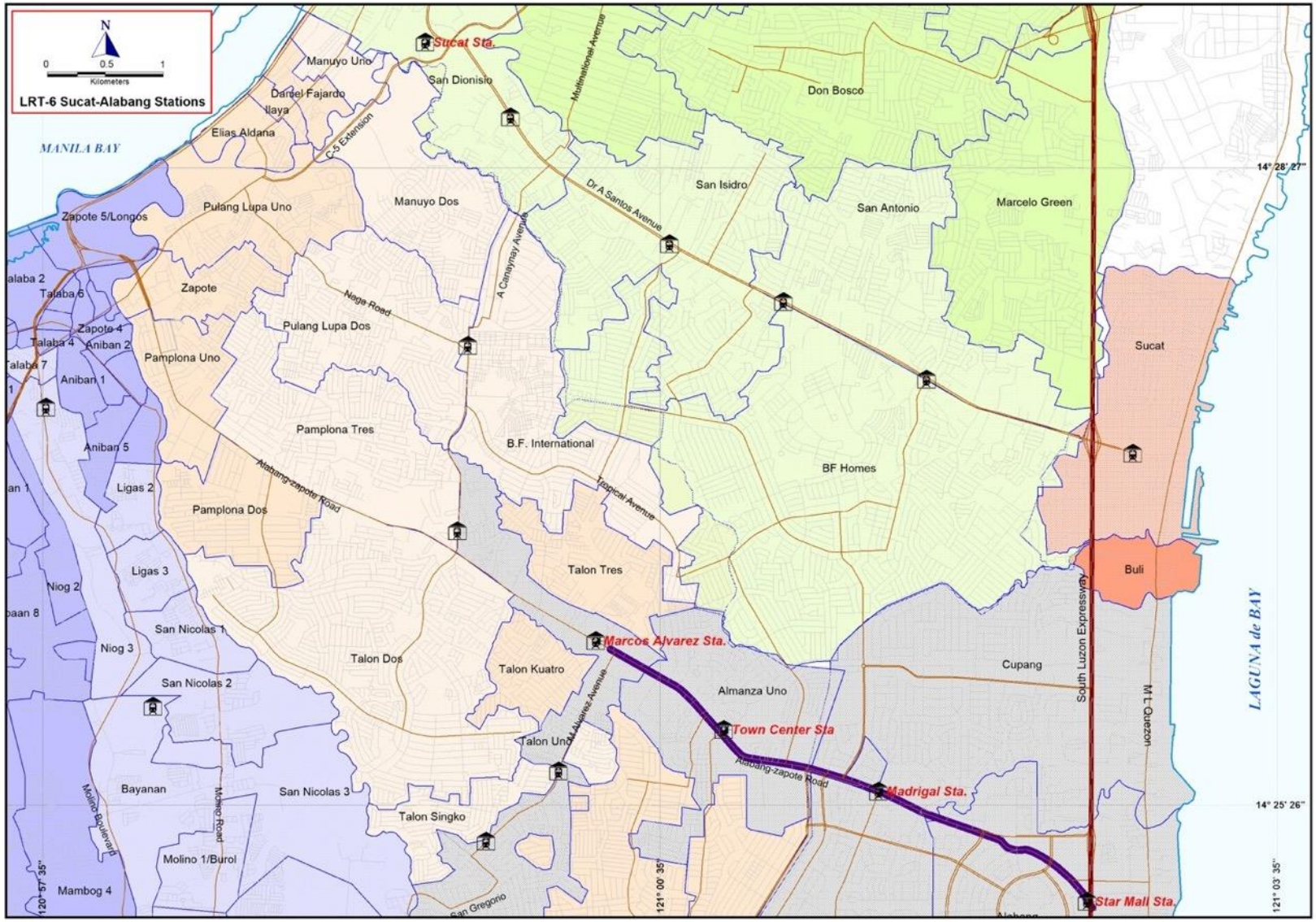


Figure 2-8. Alignment of Alabang-Zapote LRT Line.

The main project components of each LRT 6 alignment will consist of the railway tracks and station, the light rail vehicle (LRV), signaling system, communication system, fare collection system, traction electrification system and the depot. These components are briefly described below.

2.4.1 Railway Tracks

The railway track will consist of the rails, fasteners, sleepers and ballast or slab track/concrete plinth including the underlying subgrade. The track using ballast is called the ballasted track type while the track using the slab track/ concrete plinth is known as the ballast-less track type (**Plate 2-3**). In the ballasted track, rails are supported on timber or pre-stressed concrete or other types of sleepers with the accessories laid out on crushed stone ballast to support the ties and allow some adjustment in their position. Periodic maintenance such as tamping of the ballast is done to maintain the right rail position.

Ballast-less track types have longer life cycles, allow for high speed train operation, has higher load-carrying capacity and lower track maintenance costs. However, initial construction cost is higher compared to the conventional ballasted track type.

Although the ballasted track type has higher maintenance cost, it has its advantages such as high elasticity, high noise and vibration absorption, and low construction cost.

The project will use the ballasted track for most sections of the different alignments to reduce initial investment cost and the ballast-less track in some segments of LRT Line-6B+C to reduce track maintenance costs.

The tracks will have a carriageway width of 9 m and a vertical clearance of 6.5 to 7.2 m from existing road surface. Foundation support will be single column piers on bored piles with piers occupying about ½ lane of existing roads.

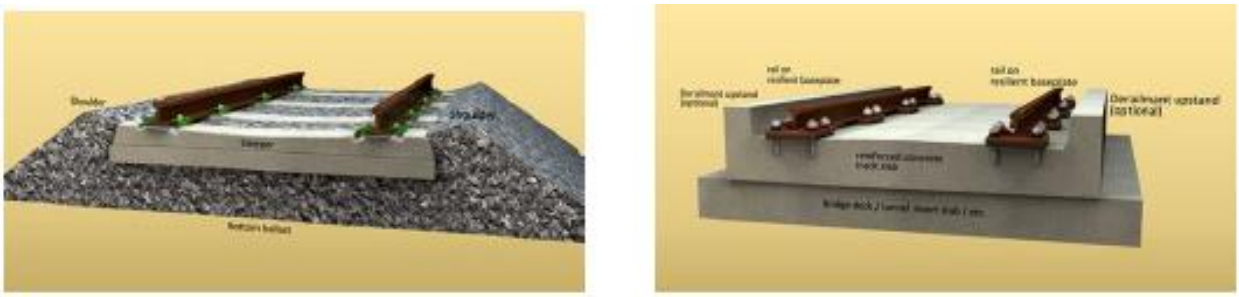


Plate 2-3. Ballasted (left) and ballast-less (right) track (Modified LRT 6 FS, 2018).

2.4.2 Stations

The platform length will be 110 m to accommodate 100 m long train fleets. Platform width will be about 3 m. Station to station distance will range from 1.5 to 3.5 km. Stations will be planned during the detailed design phase to provide various facilities for transit passengers and feeder service.

Two platform types will be adopted: the side platform type and island platform type. The side platform will have two platforms positioned on each side of the double tracks while the island platform will have a single platform located between the two tracks (**Plate 2-4**). Most stations will have the side platform type (20 m x 110 m) except at the Queen's Row and Apollo Stations of LRT Line-6B where the island platform type (13 m x 110 m) will be used. Stations will be equipped with elevators/escalators, utilities, circulation, lighting, security measures and auxiliary spaces for ticket sales, passenger information, station administration and commercial use.

The stations will be built on major intersections or facing major roads to make it easier for passengers to transfer to other modes of transportation.

Plate 2-4. Example of side platform (left photo) and island platform (right photo) stations.

2.4.3 Vehicle Type

The project proposes to use a single-articulated, six-axle, standard floor car type with eight passenger doorways (four on each side) similar to the train shown on **Plate 2-4** above. Vehicles will be capable of multiple unit operation consisting of up to four cars with total length of 100 m while each end of the car will be equipped with an operator's position. Each car will have a passenger capacity of 347 and will have an operating speed ranging from 35 to 70 km/h.

2.4.4 Signaling System

The signaling system will consist of:

- Automatic train protection (ATP) subsystem which will provide control functions with regards to safety;
- Automatic train operation (ATO) subsystem that will provide automatic-mode train operation functions subject to constraints imposed by the ATP;
- Automatic train supervision (ATS) subsystem which will monitor system status and overall operation and will manage the system communications interface. The ATS performs data recording on operations and sends out warnings to the system when an abnormality occurs. The ATS also provides human-machine interface that can be controlled from the center.

The ATP subsystem will consist of the following functions:

- Presence detection
- Route settings
- Unintentional motion detection
- Overspeed prevention
- Overrun prevention
- Prevention of cars from disengaging
- Lost signal protection
- Detection of zero speed
- Prevention of unintentional door control
- Door control protection interlocking
- Departure interlocking
- Directional change interlocking
- Braking interlocking
- Switch interlocking

The ATP function will have precedence over both the ATO and ATS functions. The ATO subsystem will have the functions for operation control and stops at fixed point by the program, while the ATS subsystem will be used to monitor the conditions of operations, control and override operations.

2.4.5 Communication System

The communication system will ensure effective daily operation of the railway system and will provide monitoring information on the situation to enable the immediate restoration of the system during an emergency. The main communication equipment will consist of:

- Wireless communication systems (train radio, emergency alarms, wireless for maintenance)
- Telephone facilities (office telephones, command telephones, interphones, etc.)
- CCTV monitoring facilities
- Guidance broadcasting facilities
- Other communication facilities (e.g. fiber optic LAN, clock, UPS, etc.)

2.4.6 Fare Collection System

The fare collection system will consist of ticket vending machines (TVM), a central data collection and information system, and stand-alone validators (SAV). The necessary number of TVMs and SAVs will be installed in the stations based on daily passenger flow.

2.4.7 Traction Electrification System

The traction electrification system will provide electrical power to an LRV by means of a traction power system (TPS) and an overhead contact system (OCS). The TPS will consist of the traction power substations (TPSS) and the traction power feeder system (TPFS). The light rail vehicle (LRV) will collect current from the contact wire by pantographs and will return the current to the substations via the running rails. The TPSS will consist of the traction power substations located along the LRT lines which will receive primary power from the local power supplier. The substations will include all the necessary equipment to transform and rectify the primary AC three-phase power to the DC traction power.

2.4.8 Depot and Facilities

The depot will house the equipment for the maintenance of rolling stock, infrastructure, and the LRT systems. The depot will have the following functions:

- LRV parking
- LRV cleaning
- Daily inspection
- Daily maintenance
- Preventive maintenance
- Heavy maintenance
- Fixed asset maintenance
- Maintenance buildings for above functions
- Operation and control center (OCC)
- LRT administration

The normal depot operation will include:

- LRVs start from stabling and goes directly to the main line for operation

- LRVs return to the depot from operation, pass through the washing machine, undergo daily inspection and stabling or go to the maintenance bay
- Periodic maintenance activities to/from maintenance bay/stabling racks

The depot will be located in Dasmariñas City and an access road to Molino-Paliparan Road will be constructed to allow the delivery of spare parts and various materials used for maintenance work.

Maintenance activities at the depot will be as follows.

Table 2-13. Maintenance Activities at the Depot (Modified LRT 6 FS, 2017).

Maintenance	Cycle	Remarks
Scheduled cleaning	Every day	• using an automatic washing machine • The inside cleaning will be performed during LRT off-operation.
Exterior cleaning Reinforced cleaning	Every three days Every month	• In stabling position (mobiles platforms, high pressure cleaning equipment, stairs, grated floor ...) or in an adapted track of the LRT workshop
Daily inspection	Every day	• visual checks/inspection (including pantograph and power collector)
Regular inspection Intermediate inspection	Every three months Every three years	• Inspection of traction power systems, brakes, etc.
General inspection	Every six years	• Inspection dismantling all of major parts including pantographs, bogies, wheels, etc.

2.4.9 Pollution control devices

In addition to the mitigating and enhancement measures for identified project impacts during the construction and operation phases of the project, the following pollution control devices will be installed to address selected project impacts during the construction and operation phases.

Environmental Parameter	Pollution Control Device
Construction Phase	
Water quality	Silt traps and oil sump
Noise	Mufflers on construction equipment, machinery and vehicles
Operation Phase	
Water quality	Installation of septic tanks in toilet facilities inside station terminals and depot
Noise	Noise barriers between noise source and receiver

2.5 Process/Technology Options

2.5.1 Description of the processing/manufacturing technology

A casting yard will be identified by the contractor for the casting of the beams and girders. Pre-tensioned girders will be more effective in terms of quality control since they no longer require ducts and grouting.

2.5.2 Description of pollution control devices and waste management system

The main areas of environmental concern during the construction of an infrastructure project are air, water and noise pollution. Construction activities that are expected to contribute to air pollution include the operation of diesel engines, excavation, clearing, burning and working with toxic materials. Construction sites typically generate high amounts of dust that is classified as PM_{10} or particulate matter that is less than 10 microns and invisible to the

naked eye. PM_{10} is known to penetrate deeply into the lungs and can cause a wide range of health problems such as respiratory illness, asthma, and bronchitis. Exhaust from diesel engines or vehicles and heavy equipment in the construction sites also produce PM_{10} in the form of soot, sulfates and silicates that combine readily with other toxins in the atmosphere, increasing the health risks of particle inhalation. Diesel also emits carbon monoxide, hydrocarbons, nitrogen oxides and carbon dioxide. Chemicals that are widely used in construction sites include oils, glues, thinners, pains, plastics, cleaners and other hazardous chemicals also generate noxious vapors that contribute to air pollution.

Water pollution from construction sites can come from spills and leaks of diesel and oil, paints, solvents, cleaners and other harmful chemicals. Construction debris and silt can also contribute to water pollution. Clearing and excavation causes erosion and silt-laden runoff that contribute to siltation and sedimentation of water bodies that can restrict sunlight filtration that affects aquatic life. Spills and leaks from construction sites containing chemicals, diesel and oil can poison aquatic flora and fauna and affect groundwater sources.

A lot of noise is generated in construction sites mainly from the operation of vehicles, heavy equipment, and machinery. Excessive noise can be annoying and distracting and can lead to hearing loss, high blood pressure, sleep disturbance and extreme stress. Excessive noise also disturbs the natural cycles of animals and can reduce their usable habitat.

Solid wastes from packaging of construction materials such as plastics, cartons, crates, nets, etc. as well as domestic wastes at the construction sites and construction camp can also be significant considering the magnitude of the project. Pollution and wastes at the construction site can be prevented and controlled through the following measures:

- Mitigating measures for air quality impacts
    - Control dust through fine water sprays that dampen the construction sites
    - Screen the construction sites to prevent the spread of dust of place fine mesh screens close to the dust source
    - Cover trucks loaded with construction materials
    - Use low Sulphur diesel in all vehicles and equipment and incorporate latest specifications of particulate filters and catalytic converters
    - Refrain from burning materials on site
- Mitigating measures for water quality impacts
    - Minimize land disturbance and leave maximum vegetation cover to prevent erosion and surface runoff
    - Cover piles of construction materials and regularly check for spillages
    - Locate piles of construction materials in areas where they cannot be washed into waterways or drainage areas
    - Use non-toxic paints, solvents and other hazardous materials whenever possible
    - Segregate, cover tightly, and monitor toxic substances to prevent spills and possible site contamination
    - Cover up and protect all drains in the vicinity of the construction sites
    - Collect wastewater generated by the construction in settling tanks, screen and discharge clean wastewater and dispose remaining sludge according to DENR standards and guidelines
- Mitigating measures for noise impacts
    - Reduce noise pollution through careful handling of materials, use of modern and quiet power tools, equipment and generators, and place walls around the construction sites in heavily populated areas to serve as sound shields
- Management of solid wastes
    - Reduce solid wastes by avoidance, reduction, reuse, and recycling

- Solid wastes shall be collected, sorted, and stored in containers that prevent these items from being introduced into the environment
- Waste should be collected by an authorized waste hauler and transported to a DENR accredited facility for proper disposal
- Hazardous wastes (light bulbs, used oil, etc.) shall be collected separately and collected by an authorized hazardous waste transporter and treater
- Construction workers should be instructed to bring out their individual solid wastes after the end of their shift

2.5.3 Description of the operations and maintenance of the facility

The general operating policies of LRT 6 include the following:

- Provide safe, secure, punctual, convenient, reliable, clean and affordable services to the users
- Flexible adjustment of operation headways to provide comfortable and convenient service to the passengers
- Convenient transit to and from other modes including feeder systems
- Reduction of operation and maintenance costs

A Special Purpose Company (SPC) will be incorporated for the operation and maintenance stage and will have the following tasks:

- Project management over the concession period
- Administration of the SPC operation
- Overall engineering and construction of the LRT system
- Overall operation and maintenance of the LRT system

The operating strategies will include:

- No overtaking at an intermediate station or shuttling back and forth operations
- Minimum alighting time at an intermediate station is 30 seconds
- Minimum boarding time at an intermediate station is 30 seconds
- Shuttle operation at a terminal is 3 minutes
- The scheduled train speed is 35 km/h
- The LRT will operate from 0500H to 2400H seven days a week with more frequent services during the morning and afternoon/evening peak hours
- All lines will have double tracks except at the Sucat-NAIA Link where a single-track operation is being considered
- LRT Line-6B and Line-6C will share the track between Sucat Station and Canaynay Station
- It is estimated that Line-6B will require 20 trains/hour while Line-6C will require 15 trains per hour

2.6 Project Size

The project size in terms of number of stations and alignment length is summarized below.

Table 2-14. Length of Project Alignments.

Project Alignment	Road Location	Length of Alignment	Number of Stations
LRT Line-6A	Molino-Paliparan Road	23.5 km	8
LRT Line-6B	Canaynay-CAA-M. Alvarez Ave.	15.4 km	8
LRT Line-6C	Dr. A. Santos Ave. (Sucat Road)	7.7 km	6
Alabang-Zapote LRT Line	Alabang-Zapote Road	5 km	4
Total		**51.6 km**	**26**

2.7 Development Plan, Description of Project Phases and Corresponding Timeframes

2.7.1 Pre-construction

The pre-construction phase will include the following activities:

- Feasibility study, project promotion and project development
- Investment proposal and joint venture agreement
- Detailed design with bid-ready plans, specifications and cost estimates
- Geotechnical investigation to determine soil structure, soil strength, permeability, groundwater condition, etc.
- Right of way acquisition
- Acquisition of permits and LGU endorsements
- Bidding and awarding of contracts for railway construction
- Preparatory activities before actual construction will include the following:
    - Procurement of trackwork materials
    - Preparation of construction materials, setting up of construction camp and office, staging areas, etc.
    - Scheduling and planning of construction activities
    - Preparation of vehicular and pedestrian traffic management plans and activation of detours for both pedestrian and vehicular traffic
    - Relocation of utilities
    - Site preparation

2.7.2 Construction

Construction activities will commence as soon as designs and government permits, and approvals are secured. The Construction Contractor will require offices and staging areas in each project alignment. The staging areas will be fenced and will have 24-hour security. The final location of the construction office, staging area and construction camp will be determined by the contractor.

The structure of an elevated metro railway is similar to a bridge in that it allows passage of vehicles and pedestrians beneath the structure. The elevated railway is grade separated from other modes of traffic to enable the metro rails to drive fast and safe without hindrance. The elevated structure is divided into an upper part (superstructure) consisting of the deck, floor system and main trusses or girders, and the lower part (substructure) consisting of the piers, columns, footings, piles and abutments. The superstructure provides horizontal spans and carries traffic load directly while the substructure supports the horizontal spans and elevates the superstructure above ground surface. The general steps that will be followed during construction of the substructures and superstructures are briefly described below.

2.7.2.1 Construction of substructures

The construction of the Project will commence with the construction of substructure components that will support the elevated structures. Substructure components typically consist of reinforced concrete structures and commonly considered types include:

- Single column hammerhead type piers
- Multi-column piers with rectangular caps
- Trestle bents
- Wall piers
- Abutments of various types

Reinforced concrete single column piers are being considered for the project to minimize impact to the roads traversed by the project alignment (**Table 2-15**). The piers will occupy about half a lane (1.2 m) of the existing roads. Piers are an integral part of the load path between the superstructure and the foundation. Piers are designed to resist the vertical loads from the superstructure, as well as the horizontal superstructure loads not resisted by the abutments. For this project, single column piers will either be supported by bored piles or rigid frame type pier with bored piles. Vertical clearance of piers will be 6.5 to 7.2 meters from existing road surface. The substructure types considered for this project are tabulated below and shown on **Figure 2-9**.

Table 2-15. Substructure types considered for the Project.

Type	Description	Rail Level	Application
Type A	Single column pier with bored pile	RL=10-15 m	LRT Line-6B
Type B	Single column pier with bored pile	RL=7.5 m	LRT Line-6A
Type C	Rigid frame type pier with bored piles	RL=10-15 m	LRT Line-6B

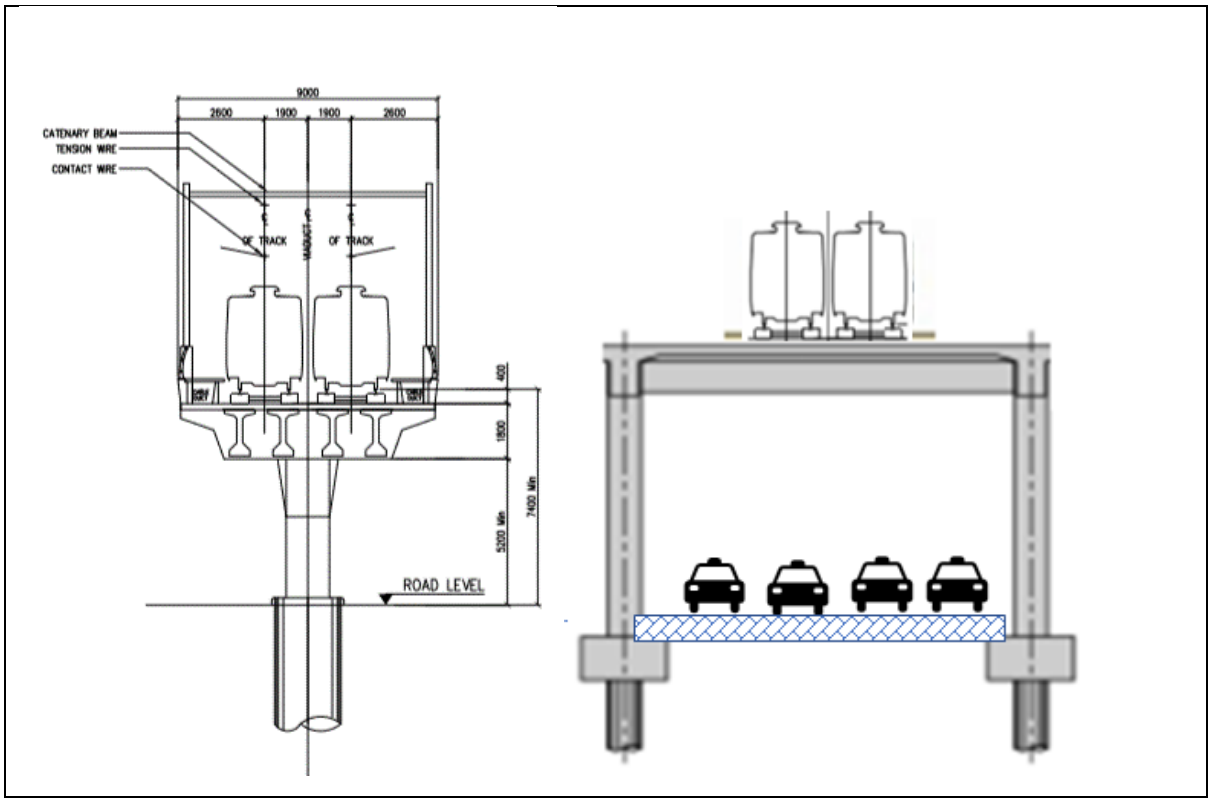


Figure 2-9. Single column pier (left) and rigid frame type pier (right).

2.7.2.2 Construction of superstructures

Precast concrete bridge segments and other precast concrete components of the project will be manufactured in a pre-casting plant. Casting methods will include: (1) casting segments in stationary molds and moving the segments from the casting position to counter-mold position and then to storage; or (2) casting segments on long benches wherein the segments will remain stationary while forms move along the benches from one casting position to another.

Match-casting is done for both methods, which means that each segment will be cast against the previous one to ensure perfect fit of each segment against its neighboring segment when erected. The pre-casting plant will be equipped with tower cranes and movable cranes.

The standard superstructure for this project will consist of four I-girders with span length of 20 to 30 m and a reinforced concrete slab (LRT 6 FS, 2018). Three types of superstructures are considered depending on the rail section and radius of curvature of the horizontal alignment.

Table 2-16. Superstructure types and span lengths for the Project.

Type	Span length (m)	Application
Type A	L = 30 m, 4 I-girder type	Straight line sections
Type B	L = 25 m, 4 I-girder type	R=70-80 m sections
Type C	L = 20 m, 4 I-girder type	R=50 m sections

The following description of the construction process of superstructures for a rail project are taken from Mondorf, 1993[2].

When the segments are ready for erection, they will be transported from the pre-casting plant to the site on low-bed trucks or trailers. The segments will be erected span by span using erection girders and will be adjusted into position so that matching keys fit perfectly. The segments are then stressed together by post-tensioning tendons to allow the spans to be self-supporting. The weight of the spans will be transferred to permanent bridge bearings and the trusses will be separated from the spans and shifted forward in preparation for the erection of the next span.

Pier brackets are first installed on the columns ahead of the arrival of the trusses. Erection of the span will start with the exact positioning of the trusses, first length-wise then crosswise and then in elevation. Four hydraulic jacks which will support each truss on the pier brackets will facilitate the operation. Segments will be lifted successively by a crawler crane and will be placed on rollers on the top chords of the trusses. Each segment will be supported on three rollers and once all segments have been brought up on the truss, the adjustment process will start. Each segment will be adjusted using small hydraulic jacks and will be shimmed until the segment is aligned perfectly with the previous segment. Once the adjustments are completed and the overall position of the span has been corrected with all joints closing properly, post tensioning operations will start. Post tensioning jacks will either be hung from a monorail on a special working scaffold or the jacks will be held in position by mobile cranes from ground level. About two thirds of the total post tensioning force will be needed to allow the span to carry freely and when this force is reached, dry pack mortar will be placed under permanent bearings and will be left to harden for 6-12 hours. When these are ready, the trusses will be separated from the span that will now rest on permanent bearings. Erection of a typical span will take about 2-3 days. Finishing operations will include grouting of tendons, installation of hold-down rods, cleaning of bearings, possibly a few concrete repairs, filling of block-outs, etc. The contractor is expected to have several sets of erection girders, pier brackets and tower cranes in order to finish the construction on schedule.

The precast concrete cross beams for the station platforms will be erected by mobile cranes operating at ground level. The cross beams will be lifted successively, and their lower ends will be keyed into brackets which will protrude from the segments at the level of the lower slabs. At the level of the segment wings, the cross beams will be initially attached by bolts and temporary cable slings. The temporary connections will be replaced with permanent post-tensioning tendons anchored in the two cross beams to form a pair. The lower end of each cross beam will be secured against the segment web through a heavy steel rod that will be properly grouted after stressing. Erection of the platforms will be completed by placing precast concrete sidings and slabs along with the casting in place of joints and end parts. Platform erection is estimated to take about 10 days per station.

[2] Mondorf, P.E., 1993. Design-Construction of Precast Segmental Elevated Metro Line for Monterrey, Nuevo Leon, Mexico. PCI Journal, pp 42-56. Accessed from https://www.pci.org/PCI_Docs/Design_Resources/Guides_and_manuals/references/bridge_design_manual/JL-93-March-April_Design_Construction_of_Precast_Segmental_Elevated_Metro_Line_for_Monterrey,_Nuevo_Leon,_Mexico.pdf

2.7.2.3 Construction of embankment

Embankment type will be used in the section between Daang Hari and San Pedro Stations to reduce construction costs. A railway line is raised on an embankment made of compacted soil to avoid the change in level required by the terrain. Embankments are normally constructed using non-aerated and waterproofed compacted material to provide adequate support to the formation and a long-term level stable surface.

Engineers will plan the works of the railway in such a way that the quantity of soils to be excavated shall be equal to the quantity of fill material needed to form the embankment. However, if excavated materials will not be sufficient to form the required embankment, additional fill materials will be sourced from borrow sites or quarry areas that are accessible to the project site.

The construction sequence for the embankment is briefly discussed below[3].

- Excavation – excavation will be done to a suitable level to remove the surface unsuitable material or loose soil and organic materials;
- Stabilization – this will involve the improvement of the embankment excavation base through the placement of crushed material or rock fill to stabilize the excavation base and facilitate the passing of machinery during compaction;
- Separating geotextile – non-woven geotextile will be placed on the embankment excavation base which will also extend the longitudinal side drains;
    - First drainage layer – this will have a thickness of about 0.25 m and will consist of crushed materials needed to drain the groundwater collected through the installed vertical drains and lead it to the longitudinal side drains;
    - Installation of prefabricated vertical drains at triangular grid with length determined based on the results of the performed geotechnical analyses'
    - Installation of second drainage layer of 0.25 m thickness and consisting of crushed material;
    - Construction of longitudinal side drains along the embankment with vertical drains in order to lead the groundwater that is collected from vertical drains to adjacent hydraulic systems; the side drains will consist of coarse-grained materials with perforated plastic drain pipe inside;
    - Spreading of non-woven separating geotextile that is extended to the longitudinal side drains
- Foundation of the embankment – this layer will be above the drainage layer and will consist of crushed material or rockfill free-drainage material having maximum particle size of 10 to 15 cm and will be compacted;
- Drainage layer – the foundation of the embankment will be completed by constructing the drainage layer up to 50 cm above the original ground surface in order to achieve dissipation of any excess pore water pressure inside the core of the embankment
- Core of the embankment – this will be constructed using suitable materials that will be compacted to at least 95% of the maximum dry density;
- Prepared subgrade layer – this will consist of crushed materials that will be compacted to at least 100% of the maximum dry density of the Standard Proctor Test;
- Blanket layer and ballast – this will be constructed using well-graded coarse-grained materials (sand and gravel) that will be compacted to at least 103% of the maximum dry density; the ballast will be 0.30-0.50 m thick and will consist of materials having diameter of 2.0-6.0 cm.

[3] Source: https://www.geocasehistoriesjournal.org/images/papers/166/6_CONSTRUCTION_METHODOLOGY.pdf

2.7.2.4 Construction of railway tracks

The fundamentals of building a ballasted railway has not changed much since the early days of railroading except that better equipment have been developed to handle the work[4]. The construction of a ballasted railway will begin with the spreading of the initial or bottom ballast layer below the ties prior to the construction of the skeleton track. Once the bottom ballast has achieved the desired elevation, it is compacted using a drum roller or similar equipment so that the ballast particles are firmly interlocked, and the surface becomes planar and unyielding. This is important to maintain stability of the track under thermal and dynamic forces. Once the bottom ballast has been compacted, the ballast surface must not be disturbed so as not to cause the ties of the skeleton track to have an uneven bearing.

Ties (either concrete, wood or steel) will be placed on the ballast using equipment that can handle its weight, such as spreader beams, boom trucks, and loaders. The concrete ties must be laid flat and should not have ballast bearing at their centers to prevent the tie from cracking later on in the process. Ties must be placed at the correct spacing and alignment on the prepared subgrade or ballast layer. After the skeleton track has been constructed, the track is pre-lined, and a general cleanup of the track is undertaken to prevent both valuable track material and debris from becoming lost in the ballast.

After the preceding step, more ballast is introduced into the skeleton track structure, the ultimate goal of which is to have a cross-section that has a top ballast up to the top of the rail and a robust shoulder. No equipment should apply pressure on the ties at this stage in order not to dislodge the fasteners. Top ballast can be placed using standard bottom dump railroad hopper cars or hy-rail dump trucks.

The next step involves raising the track out of the ballast up to the correct grade, positioning the track laterally to the exact alignment, then tamping the ballast. In order to minimize strain on the rail fastening system, raising the tracks should be done in at least two lifts, each not more than 3-4 inches, with the final lift, not more than 1 inch. The ballast should be tamped under the ties on either side of the rail but not on the middle of the tie. Ties should never be tamped in the middle. Over time, the ballast will migrate to the shoulders and if the middle was tamped, the tie becomes center bound and will cause the tie to crack in the middle especially if concrete ties are used.

The next step involves the use of rail-mounted equipment with the capability of transferring ballast from one side of the rail to the other side to produce the desired cross-section. The equipment will also have the ability to sweep the ballast to an elevation equal to the top of the tie.

Destressing involves the maintenance of neutral temperature of the rail to ensure that a rail of fixed length will neither be in compression or tension. It will be rare for the rail to be at an optimal neutral temperature when it is time to anchor it in place so it will be necessary to adjust the rail to a zero-stress condition at the target rail temperature. Once movement of the rail to simulate the neutral temperature has been determined, the rail is marked at quarter points to monitor rail movement and ensure that proper movement is consistent throughout the entire string. Any residual internal force in the rail should be released before measurements are marked on the rail. This will require unclipping the rail from the cross ties and using rollers or rail vibrators to eliminate any friction that is between the base of the rail and rail seats. The rail length will then be adjusted to close the gap and achieve the desired movement at each quarter point. Insulated joints may then be installed after the rail has been destressed.

Important lessons learned during track works in previous light rail projects are summarized below[1]:

- Placing ties on uneven surfaces – when ties are placed on uneven surfaces in a center bound condition, the ties may break under the weight of the rails and track construction equipment, particularly ballast trains and rail trains if these are used. Concrete ties are particularly susceptible to this.

[4] Source: https://www.nap.edu/read/22800/chapter/14#629

- Not poking ballast – if ballast is touching the underside of the rail, the electrical isolation test will fail, thus ballast must be removed from under the rail.
- Using ballast with excessive fines – when ballast comes from a quarry, it can contain fine particles and if these are in excessive amounts, the fine particles may block proper drainage of the ballast section and can cause premature degradation of the ties and the track structure as a whole. Fines can also make it difficult to achieve electrical isolation. Fine particles tend to migrate to the bottom of the ballast stockpile, thus sacrificing the bottom 10-15cm of the pile may be necessary to ensure the integrity of the track structure.
- Not documenting destressing – when destressing the rail, there must be good documentation in the form of paperwork as well as markings on the rail done using permanent paint. Not having proper documentation can lead to speculation that destressing was not done properly. The records must be maintained and passed on to the maintenance contractor.

2.7.2.5 Construction equipment

Major construction equipment required during the construction phase include the crane for lifting and placement of concrete girders, concrete batching facilities, pre-casting facilities for the manufacture of precast concrete beams and girders, and bored piling equipment. The typical construction equipment used in infrastructure projects are listed below.

Table 2-17. List of major construction equipment.

Name of Equipment		
Asphalt distributor	Diesel generator set	Rebar cutter
Asphalt paver	Excavator	Road grader
Asphalt plant	Full-service truck	Steel fabrication plant
Aspiration sweeper lorry	High bed trailer	Tandem roller
Bored piling equipment	Horizontal tower crane	Tower light
Bulldozer	Lorry crane Lowbed trailer	Transit mixers
Bulldozer	Mobile air compressor	Vibratory roller
Concrete batch plant	Pay loader	Water pump
Concrete saw	Pneumatic roller	Water truck
Concrete vibrators	Pumpcrete	Welding diesel machine

2.7.2.6 Construction schedule

Construction activities will be phased and expected to take 3.5 years to complete for each alignment. PAVI through its contractors will ensure the safety of workers and the public through proper construction site management. Necessary warning signs will be installed to inform the public and workers about the hazards within and in the vicinity of the construction areas. A comprehensive traffic management plan during construction will be prepared by the contractor and this will be coordinated with the local traffic management bureaus for effective implementation. The public will be regularly updated about the construction schedule and the traffic management plan during construction.

The preliminary project implementation timeline is provided below.

Table 2-18. Project implementation timeline (Modified LRT 6 FS, 2018).

Activity	1st year				2nd year				3rd year				4th year				5th year				6th year				7th year				8th year				9th year				10th year				11th year				12th year			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Section1: Sucat - Daang Hari																																															
Preparatory Works and Approval																																															
Construction work breakdown																																															
Land acquisition and compensation etc.																																															
Carriage way																																															
Embankment																																															
Demolition and replacements																																															
Stations & Station areas																																															
Road Flyover																																															
Track																																															
E & M																																															
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Depot																																															
Other costs																																															
Indirect Cost																																															
Section 2: Daang Hari - Governors																																															
Preparatory Works																																															
Construction work breakdown																																															
Land acquisition and compensation etc.																																															
Carriage way																																															
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Construction work breakdown																																															
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Section 3: Sucat Line																																															
Preparatory Works																																															
Construction work breakdown																																															
Land acquisition and compensation etc.																																															
Carriage way																																															
Flyover																																															
Demolition and replacements																																															
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Depot																																															
Other costs																																															
Indirect Cost																																															

2.7.3 Operation

The Project will be operated as soon as construction of an alignment has been completed.

A special purpose company (SPC) will be incorporated to take on tasks such as project management over the concession period, administration of the SPC operation, overall engineering and construction of the LRT system, and overall operation and maintenance of the LRT system.

The Project will operate seven days a week from 0500H to 2400H. More trains will be deployed during the morning and afternoon/early evening peak hours.

All lines will have double track operation except the NAIA link from Sucat which will have a single-track operation.

Headways will be set to accommodate the estimated number of passengers and maximize convenience to the traveling public. Weekends and off-peak headways will vary depending on the demand but will not exceed 15-20 minutes for urban railway operation.

Fare collection at the stations will be through ticket vending machines and ticket booths manned by Project personnel.

As much as feasible, provision for intermodal transfers will be allocated at major train stations.

Features of the Project operation are briefly described below.

- Stations – the train stations will have a standard layout consisting of a concourse level and a platform level. The concourse will contain the ticket booths and ticket vending machines and will be separated from the platforms by fare gates. Some stations can be connected at concourse level to nearby buildings for easier access. The stations will also be designed to occupy the entire span of the road below the station to allow passengers to safely cross from one end of the road to the other side.
- Safety and security – safety notices will be placed in appropriate areas inside the stations. Security personnel will screen the passengers and their bags/baggage before being allowed entry into the train station. Security guards will also be deployed at the platforms/boarding areas to manage the passengers and warn them about the appropriate distance from the platform edge. During emergencies or unexpected events onboard the trains, passengers will be alerted using three alert codes: code blue for increased interval time between train arrivals, code yellow for the slight delay in departure and arrival of trains from stations, and code red for the temporary suspension of all train services due to technical problems. Smoking, bringing in of hazardous chemicals as well as sharp pointed objects inside train stations will be strictly prohibited.
- Fare collection and ticketing – the fare collection system will consist of a single journey or stored value Beep cards that will be sold at manned ticket booths or on ticket vending machines. Single journey tickets will be valid on the day of purchase and will expire if not used to exit the system within a specified time period while stored value tickets will be used on the LRT 6 lines and will be reloadable when load amount is fully consumed.
- Rolling stock – this will consist of light rail vehicles in a three- or four-car configuration. LRVs will be airconditioned. LCD screens will be installed near the ceiling of the train to show news, advertisements, current train location, arrivals and station layouts, etc.
- Depot – the depot will have equipment for the maintenance of rolling stock and other LRT infrastructure and equipment. It will be located in Dasmariñas City (see Section 2.4.8 for a more detailed description).
- Maintenance – preventive and corrective maintenance will be done on the rolling stock. This will consist of daily cleaning, exterior cleaning every three days, reinforced cleaning every month, daily inspection, quarterly regular inspection, an intermediate inspection every three years and general inspection every six years. An LRT maintenance building will be constructed in the depot to house all maintenance activities.

2.7.4 Decommissioning/Abandonment/Rehabilitation

The proponent is expected to complete the project once construction activities have commenced. However, should the project be abandoned at any time during project implementation, the site will be restored to its pre-construction state as much as possible. Construction materials will be removed from the site and all construction spoils will be disposed of in government-approved disposal facilities.

2.8 Manpower

Construction of the Project will require about 3,250 personnel and workers at various times during the project development. The estimated manpower requirement during construction is listed below:

- Construction management – about 40 personnel
- Supervisors – about 60 personnel
- Skilled workers – about 150 personnel
- Non-skilled workers – about 3,000 personnel

The estimated manpower requirement during the operation and maintenance phase is presented below.

Table 2-19. Manpower requirement for the operation and maintenance of the Project.

	Unit	2,022	2025	2030	2035	2040	2045	2050	2055
Administration, A/C etc.	person	42	42	49	56	70	70	70	70
Engineering	person	10	10	12	14	17	17	17	17
Subtotal		52	52	61	70	87	87	87	87
Maintenance									
Infra/Track maintenance	person	61	61	71	81	101	101	101	0
Electric/Power supply	person	66	66	76	87	109	109	109	0
Rolling Stock	person	72	72	100	115	166	177	177	0
Operation/Drivers, OCC	person	50	50	69	78	112	123	123	0
Station operation	person	72	101	118	134	168	168	168	0
QA/Procurement	person	9	9	11	12	15	15	15	15
Subtotal		330	359	444	508	672	693	693	15
Janitorial	person	150	210	210	210	210	210	210	0
Security	person	150	210	210	210	210	210	210	0
Subtotal		300	420	420	420	420	420	420	0
Total		682	831	925	998	1,179	1,200	1,200	102

2.9 Indicative Project Investment Cost

The proposed project has an estimated development cost of Php72.2B. Direct costs including civil works, construction of station buildings and development of station area, trackwork, rolling stock, electromechanical costs, depot and facilities constitute almost 68% of the total development cost. Indirect costs such as ROW acquisition and engineering design make up about 32% of the development cost.

Bulk of the project financing will come from debts from banks, multilateral agencies, development finance institutions, capital markets for bonds, and export credit agencies. Equity from sponsors, pssive investors, equity funds, institutional investors and development finance institutions will form part of the project financing. Equity will consist of at least 25% of the total project financing as required by the Board of Investments (BOI).

3 ANALYSIS OF KEY ENVIRONMENTAL IMPACTS

3.1 LAND

3.1.1 Land Use and Classification

The proposed alignments of the Project will traverse highly urbanized areas consisting of medium to densely populated residential, commercial, industrial and institutional land uses. LRT Line-6A will pass through 12 barangays of Bacoor City and four barangays of Dasmariñas City in Cavite Province. LRT Line-6B will pass through three barangays of Parañaque City, seven barangays of Las Piñas City and three barangays of Bacoor City. LRT Line-6C will pass through four barangays of Parañaque City and one barangay of Muntinlupa City while the Alabang-Zapote LRT Line will pass through two barangays of Las Piñas City and three barangays of Muntinlupa City. Being located in highly built up areas, the project alignments will pass through alienable and disposable land. The following sections briefly describe the regions as well as the cities traversed by the project alignments.

3.1.1.1 Metro Manila

Metro Manila is one of the three defined metropolitan areas in the Philippines and is officially known as the National Capital Region (NCR). It is made up of 16 urban cities (Manila, Quezon City, Caloocan, Las Piñas, Makati, Mandaluyong, Malabon, Marikina, Muntinlupa, Navotas, Parañaque, Pasay, Pasig, San Juan, Taguig, and Valenzuela) and one municipality (Pateros). The region has a total land area of 619.67 km^2 or 61,967 ha consisting mostly of built-up areas with commercial, residential and institutional land uses. It was established through Presidential Decree No. 824 in response to the needs of the growing population and for the creation of the seat of government of the Republic of the Philippines.

Metro Manila is located on the southwestern section of Luzon and lies on the flat alluvial lands extending from the mouth of Pasig River in the west to the higher rugged lands bordering the Marikina Valley in the east. The region is geographically divided into four zones, namely the Coastal Margin, the Guadalupe Plateau, the Marikina Valley, and the Laguna Lowlands. The Coastal Margin consists of areas fronting the Manila Bay and has resources for fisheries and fishpond development. It has been the target for various reclamation projects to augment the available land for mixed-use development. The Guadalupe Plateau is the most suitable for urban development due to its solid foundation and infrastructure links to the rest of Luzon. The Marikina Valley has fertile land suitable for crop cultivation while the Laguna Lowlands are suitable for agriculture, aquaculture, and industrial activities.

The most dominant land use in Metro Manila is residential, accounting for roughly 65% of the total land area. Exclusive to middle-end subdivisions are located in the cities of Makati, San Juan, Pasig, Quezon, Parañaque, and Muntinlupa while informal settlements are distributed in the major slum areas of the various cities. Multiple storey condominium buildings have been developed in major areas of Metro Manila in recent years.

Commercial land uses account for about 3% of the region's land area and consists mainly of shopping centers and establishments offering financial services. These are mostly located along the arterial roads and their vicinities.

Industrial land uses constitute about 5% of the region's land area and is located mainly in the cities of Marikina, Las Piñas, Parañaque, Valenzuela, and Novaliches (Caloocan and Quezon cities).

Institutional land uses account for 5% of the region's land area and consist of government offices, schools, hospitals and churches. Most of the national government offices are located in Quezon City while each city has institutional land uses for local government offices and offices of other government agencies.

There are still sizable open spaces in Metro Manila that account for 25% of its land use. The largest open spaces are found in Quezon City and Las Piñas with about 7,330 ha and 2,258 ha, respectively.

Two national parks (e.g. the Rizal Park and the Paco Park) are located in the City of Manila. Rizal Park or Luneta is the largest urban park in Asia with an area of 58 hectares while Paco Park is a recreational garden which used to be the city's cemetery during the Spanish colonial period.

Two important nature reserves are located in the region, the La Mesa Ecopark and the Ninoy Aquino Parks and Wildlife Center. La Mesa Ecopark is a 33-hectare sanctuary developed around the La Mesa Watershed while the Ninoy Aquino Parks and Wildlife Center is a 22.7-hectare zoological and botanical garden located in Diliman, Quezon City used as a temporary shelter of confiscated, retrieved, donated, sick, abandoned and injured wild animals.

The Las Piñas-Parañaque Critical Habitat and Ecotourism Area (LPPCHEA) was declared as a critical habitat by the Philippine Government in 2007 and was listed by the Ramsar Convention as a Wetland of International Importance in 2013. LPPCHEA encompasses 175 ha and consists of Freedom Island in Parañaque and Long Island in Las Piñas. The critical habitat features a mangrove forest, tidal mudflats, secluded ponds, coastal lagoon and a beached fringed by salt-tolerant vegetation.

3.1.1.1.1 Parañaque City

Parañaque City located in southern Metro Manila was established in 1572. It was declared as a highly urbanized city on 13 February 1998. The city is bound by Pasay on the north, Muntinlupa on the southeast, Las Pinas on the southwest, Taguig on the northeast, and Manila Bay on the west. The city consists of 16 urban barangays and two congressional districts. It has a total land area of 4,657 ha and is the third largest city in Metro Manila.

Residential land uses constitute 48% of the city's land area while commercial land uses constitute 13.17%. Residential areas are distributed among the 16 barangays of Parañaque. Land use distribution as of 2017 is presented below.

Table 3-1. Land use distribution in Parañaque City (Parañaque SEP, 2017).

Land Use	Area (ha)	Percentage (%)
Residential	2,237.35	48.04
Commercial	613.44	13.17
Industrial	536.81	11.53
Institutional	57.81	1.24
Parks and playgrounds	122.75	2.64
Cemetery	124.61	2.68
Utilities	103.15	2.21
Rivers and creeks	34.08	0.73
Planned unit developments	827.00	17.76
Total	**4,657.00**	**100.00**

Barangay Baclaran remains as the principal business district of Parañaque while areas along Ninoy Aquino Avenue and Dr. A. Santos Avenue have fast-growing commercial centers. Business establishments have also proliferated in Barangay BF, along Doña Soledad Avenue in Better Living Subdivision and within Multinational in Barangay Moonwalk. Light industrial areas are located along the South Luzon Expressway.

Planned unit developments (PUDs) include portions of the city located within Boulevard 2000 stretching from Roxas Boulevard in Manila to the Coastal Road. Developments within Boulevard 2000 in Parañaque include the Asia World City in Barangays Don Galo and Tambo, Aseana City located along Roxas Boulevard, the City of Dreams complex along the Coastal Road, the Solaire Resorts and Casino, and the Resorts World Bayshore. Other PUDs in the city include the Tiger Resort complex near NAIA Terminal 1 and the proposed Ayala Land development in the city.

The existing land use and zoning map of Paranaque City are presented in **Figure 3-1**.

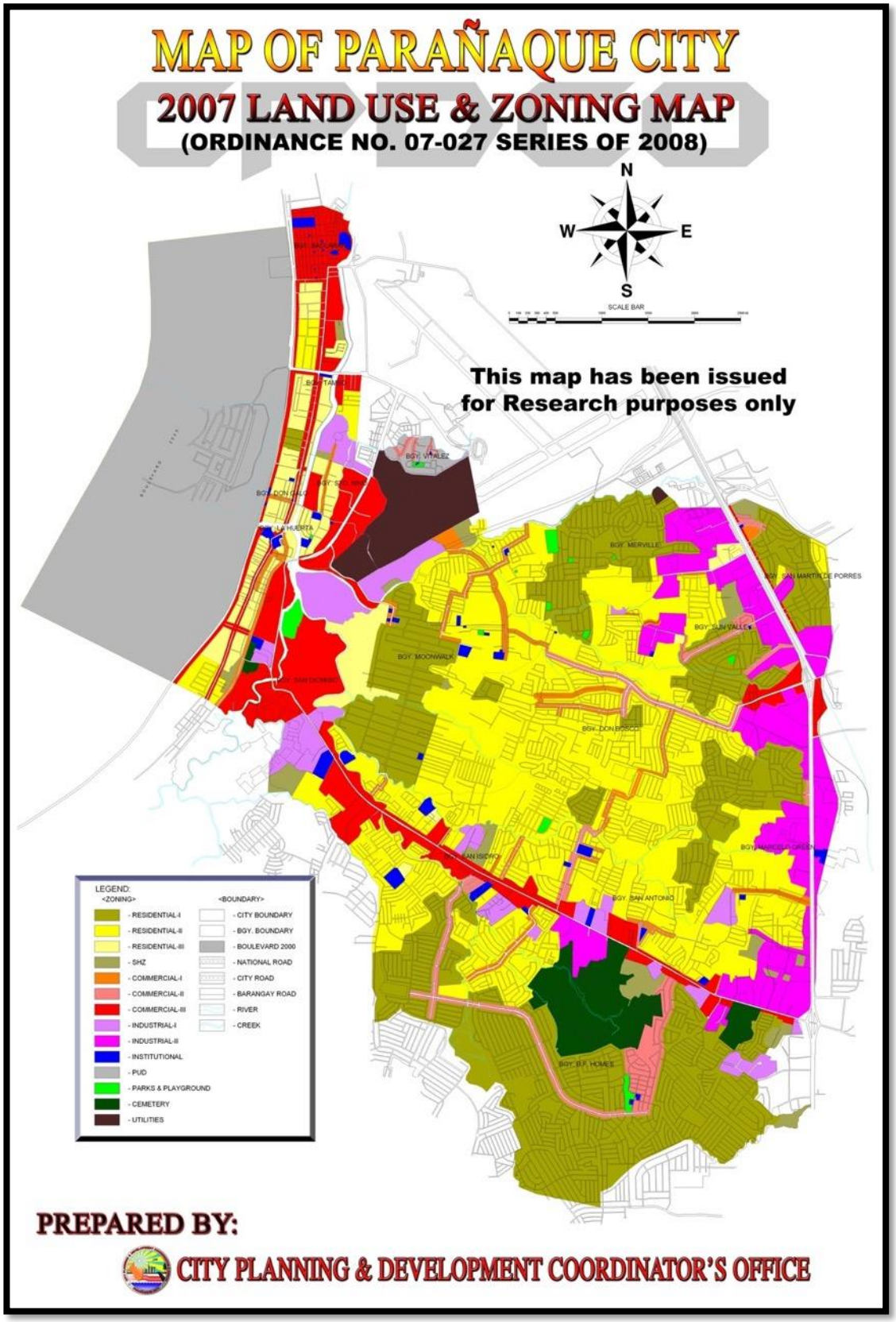


Figure 3-1. Land use and zoning map of Paranaque City (Paranaque SEP, 2017).

3.1.1.1.2 Las Piñas City

Las Piñas City is located in southern Metro Manila and is bound on the north by Manila Bay, on the northeast by Parañaque City, on the west by Bacoor City, on the southeast by Muntinlupa City, on the southwest by Imus, Cavite and on the south by Dasmariñas City. The city has a total land area of 3,298.61 ha and is subdivided into two districts and 20 barangays.

Of the total land area of Las Piñas, about 84% or 2,760 ha are classified as alienable and disposable land while the remaining 538.6 ha are used for roads, waterways, parks, and recreation. Alienable and disposable lands are allocated for residential, commercial, industrial and institutional land uses. Residential use accounts for almost 56% of the city's total land area while commercial land uses account for 6.6%. Low-density residential land uses are located in the eastern portion of the city while medium density housing areas are located in various parts of the city. High-density residential areas including informal settlements are located on the northern part of the city.

Commercial land uses are found along the entire stretch of the Alabang-Zapote Road, which bisects the city into eastern and western sections. The development of Las Piñas City follows a linear pattern, particularly along the Alabang-Zapote Road. The rapid development of the city along the Alabang-Zapote Road was influenced by the rapid development of Muntinlupa. The city's old commercial hub was along the P. Diego Cera Avenue that traverses the old city area. Establishments along this road are being restored by the city to preserve its Spanish cultural heritage.

Industrial and institutional land uses account for 2.9% and 1.9% respectively. Light to medium industries are located along the major and secondary roads of the city and consist mostly of warehouses for storage. Institutional land uses include barangay halls, hospitals, health centers, schools, and other government facilities.

The distribution of land uses in Las Pinas City is presented in **Table 3-2** below while the existing land use map is shown in **Figure 3-2**.

Table 3-2. Land use distribution in Las Piñas City as of 2011 (Las Piñas CLUP, 2014-2034).

Land Use	Area (ha)	Percentage (%)
Residential	1,837.77	55.71
Commercial	217.68	6.60
Industrial	52.43	1.59
Institutional	60.84	1.84
Parks and recreation	29.07	0.88
Cemetery	20.56	0.62
Utilities	5.44	0.16
Open Space	34.91	1.06
Vacant lands	603.51	18.30
Tourist area	10.06	0.30
River systems	36.04	1.09
Roads	390.30	11.83
Total	**3,298.61**	**100.00**

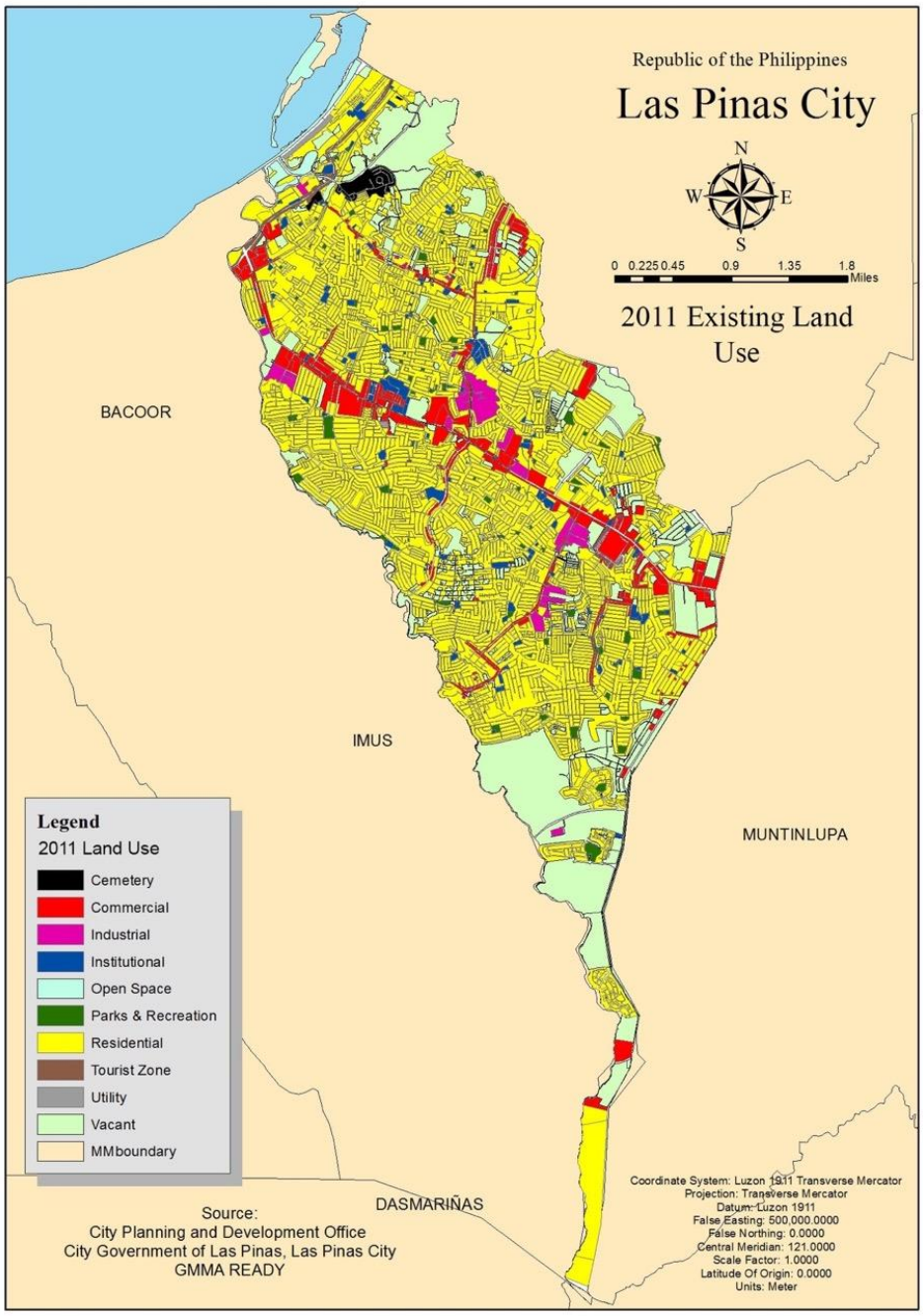


Figure 3-2. Existing land use map of Las Pinas City (Las Pinas City CLUP, 2014-2034).

3.1.1.1.3 Muntinlupa City

Muntinlupa City is located on the southern part of Metro Manila and is bound by Taguig City on the north, Parañaque City on the northwest, Las Piñas City on the west, Cavite Province on the southwest, Laguna Province on the south and by Laguna de Bay on the east. The city has two congressional districts and is subdivided into nine barangays. The city has a total land area of 3,975 ha constituting about 6.4% of the total land area of Metro Manila.

Residential land use dominates the land uses in Muntinlupa City representing 46.62% of the city's land area. Idle lands are mostly found within the National Penitentiary in Barangay Poblacion and in the unoccupied areas of Barangay Tunasan. A large portion of the city is allocated for road use, notably the South Luzon Expressway. Institutional land uses include the national government offices, local government offices, schools, hospitals and places of worship. Commercial land uses are mostly located in Barangays Alabang, Ayala Alabang, Tunasan and

Cupang. Industrial areas in the city are located along the service roads of the South Luzon Expressway particularly in Barangays Cupang, Sucat and Buli. Informal settlements are distributed among the barangays but have been drastically reduced with the transfer of informal settlers who used to reside along the Philippine National Railway tracks. Other land uses in the city include parks and open spaces, socialized housing, cemetery, utilities, and tourism sites.

The distribution of land uses in Muntinlupa is presented in **Table 3-3** while the land use map is shown in **Figure 3-3**.

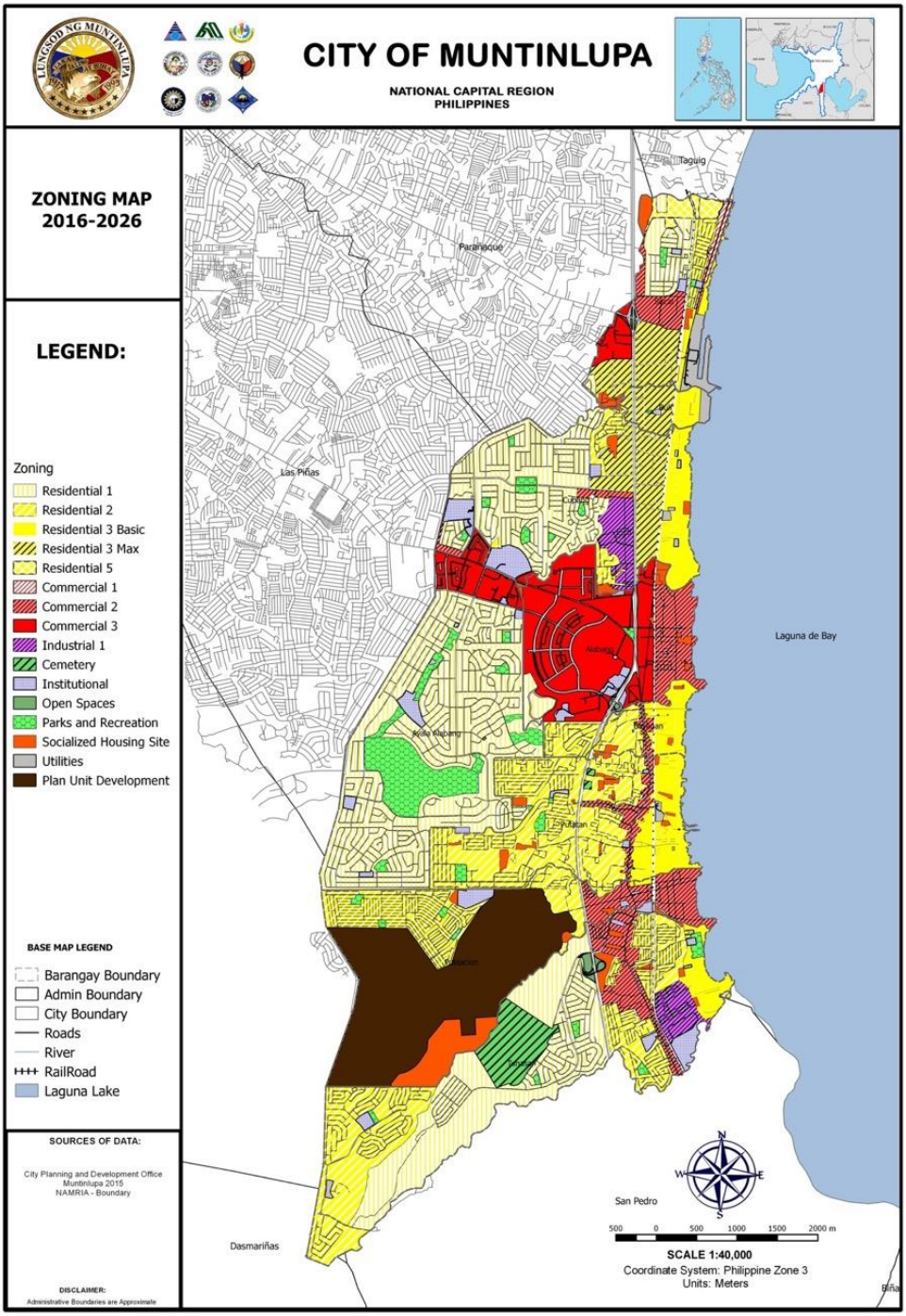


Figure 3-3. Land use map of Muntinlupa City (Muntinlupa CPDO).

Table 3-3. Land use distribution in Muntinlupa City as of 2014 (Muntinlupa Ecological Profile, 2016).

Land Use	Area (ha)	Percentage (%)
Residential	1,853	46.62
Idle lands	420	10.57
Roads	414	10.44
Institutional	298	7.48
Commercial	289	7.27
Rivers and creeks	225	5.66
Industrial	135	3.40
Informal settlements	94	2.37
Parks and open spaces	78	1.96
Socialized housing	65	1.62
Cemetery	58	1.45
Utilities	34	0.85
Tourism sites	12	0.31
Total	**3,975**	**100.00**

3.1.1.2 Cavite Province

Cavite Province is located in Southern Luzon and bound on the south by the province of Batangas, on the east by Laguna, on the northwest by Rizal province, and on the north by Metro Manila and Manila Bay. The province has a total land area of 142,706 ha or 1,472 km^2 including nine islands (Corregidor, Caballo (Fort Hughes), Carabao, Limbones, Sta. Amalia, El Fraile (Fort Drum), La Monja, Balot, and Island Cove). The coastline of Cavite stretches for about 122,574 km along the shores of its coastal municipalities and cities. Cavite is subdivided into seven legislative districts, 19 municipalities, four cities, and a total of 829 barangays.

Land resources in the province are classified as forest lands and alienable and disposable land. Forest lands account for 13,315 ha or 9.33% of the provincial land area while alienable and disposable lands account for 129,391 ha or 90.67% (Cavite PPFDP, 2011-2020). Alienable and disposable lands are subdivided into production lands for agriculture, fishery, and mining and built up areas. Production lands account for 50.09% of the provincial land area, while built-up areas occupy 40.58%.

Built up areas are found along the province's major thoroughfares and municipal/city centers and consist of residential, commercial, large institutions, industrial and tourism areas. Among the 19 municipalities and four cities of Cavite, Bacoor has the highest percentage share in the provincial urban population, followed by Imus, Dasmariñas and General Trias. These are the fast-growing cities and municipalities of the province, and although they have become densely populated, these areas still have the capacity to accept more inhabitants.

Cavite is one of the preferred destinations for industrial sites due to its proximity to Metro Manila and the presence of linkages to the national capital. The province hosts 51 ecozones/industrial estates located in the cities/municipalities of Carmona, Silang, General Trias, Imus, Rosario, Gen. Mariano Alvarez, Bacoor, Tanza, and Dasmariñas. Newer industrial zones are located in Cavite City, Trece Martires, Naic and Magallanes.

Tourism areas in the province include the Tagaytay upland area, the Ternate-Corregidor area, and the Kawit-Cavite City area. The Tagaytay upland area encompasses Tagaytay City and the municipalities of Amadeo, Silang, Indang, Mendez, Alfonso, Gen. Aguinaldo, and Magallanes and is characterized by natural tourist attractions. The Ternate-Corregidor area consists of the municipalities of Maragondon, Ternate, Naic and the island of Corregidor and is characterized by white sand beaches and blue waters rich with marine life. The Kawit-Cavite City area is the historical and cultural tourist area of Cavite province with the Aguinaldo Shrine and the Old Fort San Felipe as the main attractions.

A portion of Cavite province within the municipalities of Ternate and Maragondon has been proclaimed as a national park through Proclamation No. 1594 signed on October 1976 and as a protected landscape area under

the National Integrated Protected Areas System (NIPAS) through Proclamation No. 1315 signed in 2007. Known as the Mt. Palay-Palay and Mataas na Gulod Protected Landscape, the national park is located at the boundary of Cavite and Batangas provinces. The protected area encompasses 3,973.13 ha and includes three mountain peaks, namely Palay-Palay, Pico de Loro and Mataas na Gulod.

Other areas in Cavite that are subject to rehabilitation, conservation, and sustained development include the areas with more than 50% slope along the Tagaytay Ridge, the Magallanes forest, the Maragondon forest, the buffer areas along rivers and escarpments, and the nine islands.

Agricultural lands in the province are devoted to crop production, aquaculture, livestock production, and allied agricultural industries. Only 72.52% of the province's agricultural land is utilized (Cavite PDPFP, 2011-2020).

Mining or quarry areas in the province constitute 97.18 ha or less than 1% of the provincial land area.

3.1.1.2.1 Bacoor City

Bacoor is the northernmost city of the province of Cavite. It is bound on the north by Bacoor Bay, on the east by the cities of Las Piñas and Muntinlupa, on the south by Dasmariñas City, on the west-southwest by Imus City, and on the northwest by Kawit. Bacoor City has a total land area of 5,240 ha and is divided into 73 barangays.

Bacoor is generally flat with slightly sloping terrain towards its southern portion. The municipal waters of Bacoor cover a total of 957.25 ha and the city has a total shoreline of 5.8 km.

About 85% of the land area of Bacoor is allocated for residential use. Commercial land uses represent 2.35% of the city's land area while agricultural land uses represent 7.81% of the city's total land area. Other land uses in the city include infrastructure/utilities, institutional, parks/recreational areas, industrial, and grassland. Being an urban coastal city with generally flat topography, Bacoor has no remaining forested areas. The land use distribution in Bacoor is presented in **Table 3-4** while the land use map is shown in **Figure 3-4**.

Table 3-4. Land use distribution in Bacoor City (Bacoor CLUP, 2015).

Land Use	Area (ha)	Percentage (%)
Residential	4,511.00	85.92
Commercial	123.29	2.35
Infrastructure/Utilities	18.00	0.34
Institutional	33.30	0.63
Parks / Recreational Areas	2.00	0.04
Industrial	42.88	0.82
Agriculture	410.00	7.81
Grassland / Pasture	87.61	1.67
Cemeteries	21.92	0.42
Total	**5,250.00**	**100.00**

As can be gleaned from **Table 3-4** and **Figure 3-4**, residential land use represents a very large portion of the city's land area. Settlements and housing subdivisions are located in all 73 barangays of Bacoor. The subdivisions on the northern part of the city were developed for high and medium cost housing while those located in the southern portion were developed for medium and low-cost housing. More high-end subdivisions have been developed in recent years, including Camella Homes, Ayala Southvale, and Verdana Homes, to name a few. A total of 469 residential subdivisions are located in Bacoor City. The city also has informal settlements, which are mostly found in the coastal areas of Barangays Longos, Maliksi 3 and Sineguelasan.

Commercial areas represent 2.35% of the city's total land area. Major commercial areas are located along Emilio Aguinaldo Highway and at the intersection of Tirona and Aguinaldo Highways. More recently established commercial areas are located along Molino/Bacoor Boulevard and Molino Road. smaller commercial areas are interspersed with the residential areas.

Institutional areas in the city are located in various barangays while industrial areas consist of warehouses mostly located along Tirona and Aguinaldo Highways. Manufacturing plants are present in Barangay Niog 3. Pockets of agricultural land are located in Barangays Maliksi (I, II, II), Panapaan III, Talaba (I & II), Mabolo II, Dulong Bayan, Habay I, Alima and San Nicolas (I & II). Large areas of grassland are located in the southern barangays particularly in Barangay Molino IV. However, some of the remaining agricultural and grassland areas of Bacoor are now being converted to residential and commercial land uses.

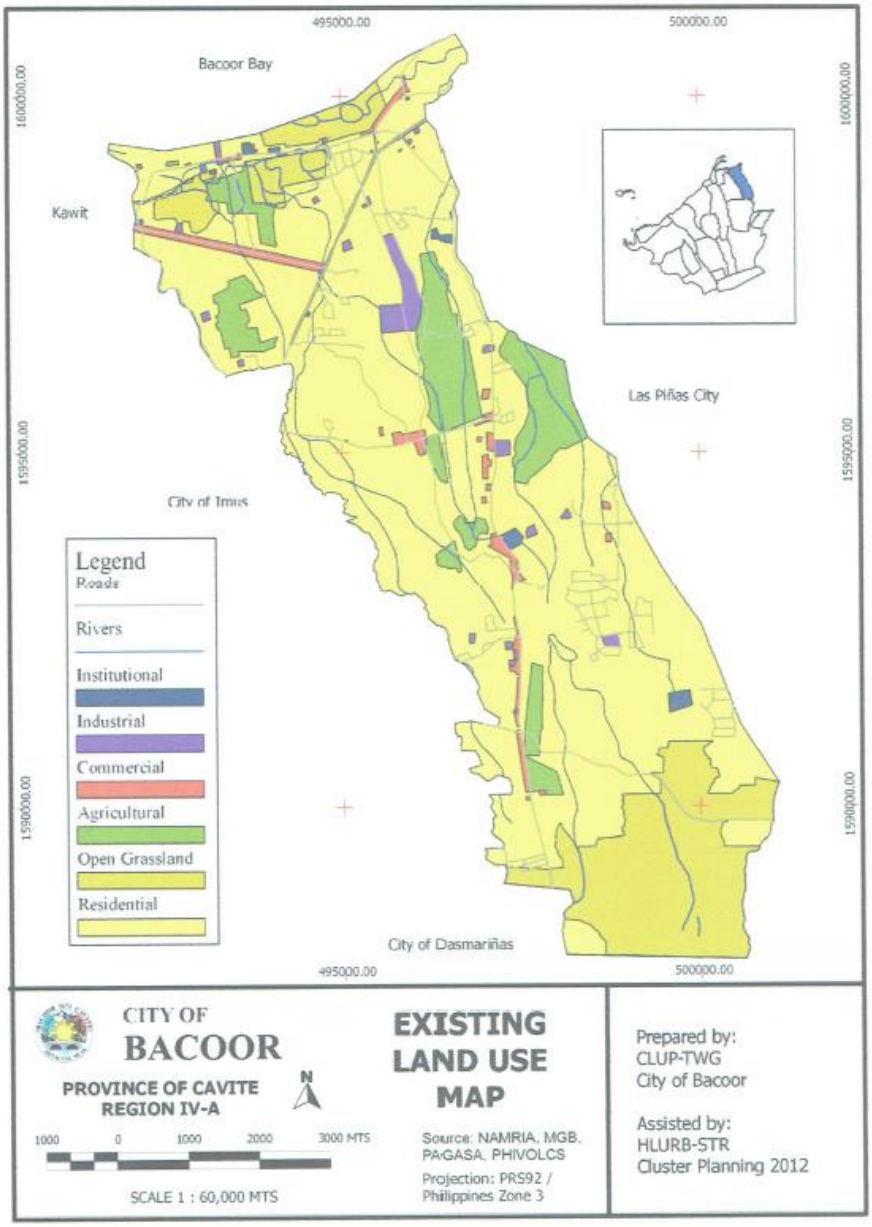


Figure 3-4. Land use map of Bacoor City (Bacoor CLUP, 2015).

3.1.1.2.2 Dasmariñas City

Dasmariñas City is located on the northeastern part of Cavite province. It is bound on the north by the cities of Imus and Bacoor, on the east by San Pedro, Laguna and General Mariano Alvarez, Cavite, on the south by Silang and on the west by General Trias. The city has an approximate land area of 9,013 ha and is subdivided into 75 barangays, 26 of which are old barangays while 49 are new barangays located at the Dasmariñas Resettlement Area.

Built-up areas constitute about 66% of the total land area of Dasmariñas City. These consist of residential, commercial, institutional, and recreational areas as well as industrial parks. Built up areas are distributed among the 75 barangays, but the biggest concentration is located in the resettlement areas, particularly in Barangays Salawag, Paliparan I, II and III, Sabang, San Jose, Sampaloc II, and Sampaloc IV.

Residential areas represent 37.79% of the total land area of the city. Clusters of settlements are located in the different barangays. The city has a total of 187 residential subdivisions. The city estimates that it will need additional areas for residential development given the increasing population of the city.

Commercial areas constitute about 3.3% of the total land area of the city and are located in the city's public market and along major city roads such as P. Campos Avenue, Camerinos Avenue, Aguinaldo Highway, and Molino-Paliparan Road. Commercial establishments include public markets, convenience stores, commercial centers, and shopping malls, and financing institutions.

Institutional areas cover about 3.4% of the city's land area. These include public and private elementary schools and high schools as well as tertiary level institutions. The city hosts major universities such as De La Salle University, Philippine Christian University and Technological University of the Philippines.

Industrial areas in the city include the 154-hectare First Cavite Industrial Estate that is considered as the flagship industrial estate of the Calabarzon Region, and smaller industrial areas located in Barangays Paliparan II, Sampaloc (I, II, III and IV), Salitran I, Salawag, Langkaan I and Langkaan II.

Agri-industrial areas consist of poultry farms and piggeries. Agricultural areas represent about 19.22% or 1,732 ha of the city's land area but only 177.85 ha are productive while the rest are seasonally used or scarcely planted to free crops. Most of the agricultural areas of the city have been converted to non-agricultural uses.

Dasmariñas City hosts the Orchard Golf Course and Country Club, a 131.15-hectare development that caters to local and foreign guests.

The land use distribution in Dasmarinas City is presented in **Table 3-5** while the land use map is shown in **Figure 3-5**.

Table 3-5. Land use distribution in Dasmariñas City (Dasmariñas CLUP, 2018).

Land Use	Area (ha)	Percentage (%)
Residential	3,405.85	37.79
Commercial	298.11	3.31
Institutional	306.96	3.41
Parks / Recreational Areas	253.30	2.81
Roads	801.48	8.89
Cemetery	142.65	1.58
Dumpsite	4.00	0.04
Tourism	13.98	0.16
Golf course	131.15	1.46
Utilities	132.55	1.47
Industrial areas	436.65	4.84
Agri-industrial	43.91	0.49
Agricultural areas	1,732.50	19.22
Open Grassland	997.11	11.06
Waterbodies	300.10	3.33
Easement	12.70	0.14
Total	**9,013.00**	**100.00**

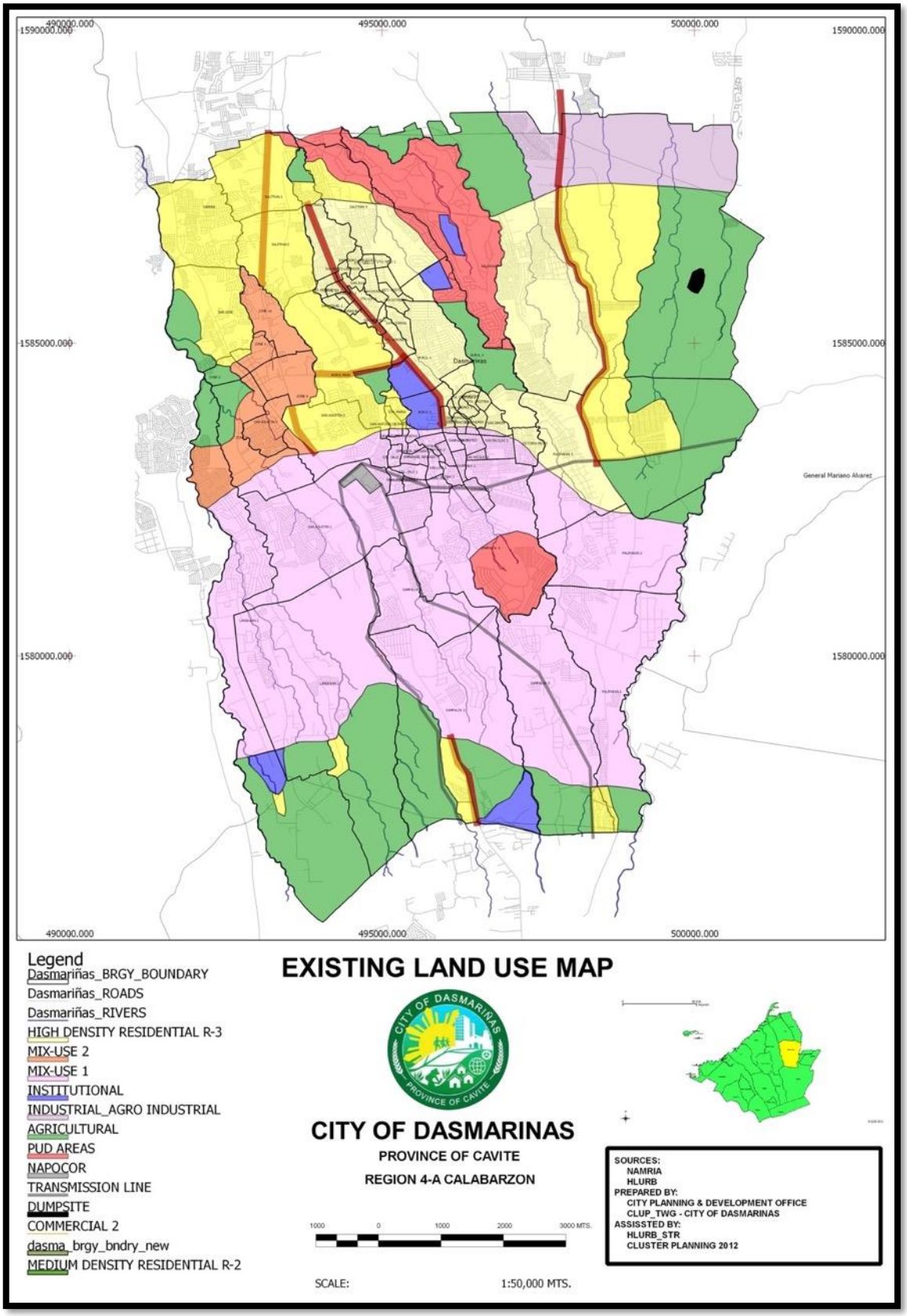


Figure 3-5. Land use map of Dasmarinas City (Dasmarinas CLUP, 2018).

3.1.1.3 Land uses along the Proposed Project Alignments

Table 3-6 lists the observed land uses along the proposed alignments of the Project. The Project will potentially affect 35 barangays of five cities. The project alignments are mostly located along busy roads lined by commercial establishments and institutional areas. Residential areas are located in the inner portions of the barangays beyond the commercial and institutional land uses. Open spaces and grassland areas are available at the undeveloped sections of Molino/Bacoor Boulevard and Paliparan Road and in the private properties that will be traversed by the project alignments. The land uses along the project alignments are shown in **Figure 3-6**.

Table 3-6. Land uses along the Project alignments.

Project Segment	Road Location	City	Barangay/s	Land Uses
LRT Line-6A				
Niog Station to Bacoor City Hall Station	Molino Boulevard	Bacoor	Talaba 4 Niog 3 Ligas 2 Ligas 3 San Nicolas 2 Bayanan	Institutional Residential Commercial Open space
Bacoor City Hall Station to San Nicolas Station	Private properties	Bacoor	Bayanan Molino 1 Molino 6 San Nicolas 3	Institutional Commercial Residential
San Nicolas Station to Daang Hari Station	Molino Road	Bacoor	Molino 2 Molino 3	Institutional Commercial Residential
Daang Hari Station to Alabang Station	Daang Hari Road Private properties	Bacoor	Molino 4	Commercial Residential
Alabang Station to San Pedro Station	Private properties	Bacoor Dasmariñas	Molino 4 Salawag	Residential Open space
San Pedro Station to La Salle Station	Private properties Paliparan Road	Dasmariñas	Salawag	Residential Open space
La Salle Station to GMA Station	Paliparan Road	Dasmariñas	Salawag Paliparan 3	Residential Commercial Institutional
GMA Station to Governor's Drive Station	Paliparan Road	Dasmariñas	Paliparan 3 Paliparan 2 Paliparan 1	Residential Commercial Institutional
LRT Line-6B				
Sucat Station to Canaynay Station	Dr. A. Santos Avenue	Parañaque	San Dionisio	Commercial Institutional Residential
Canaynay Station to Naga Station	Dr. A. Santos Avenue A. Canaynay Avenue	Parañaque Las Piñas	San Dionisio Manuyo Dos BF International	Commercial Institutional Residential
Naga Station to Alabang-Zapote Station	A. Canaynay Avenue CAA Road	Las Piñas	BF International Pulang Lupa Dos Pamplona Tres	Commercial Institutional Residential
Alabang-Zapote Station to Marcos Alvarez Station	CAA Road Alabang-Zapote Road	Las Piñas	Pamplona Tres Talon Uno	Commercial Institutional Residential
Marcos Alvarez Station to Apollo Station	Marcos Alvarez Avenue	Las Piñas	Talon Uno	Commercial Residential
Apollo Station to Queen's Row Station	Marcos Alvarez Avenue	Las Piñas	Talon Uno Talon Singko	Commercial Residential
Queen's Row Station to San Nicolas Station	Marcos Alvarez Ave. Extension Private properties	Las Piñas Bacoor	Talon Singko San Nicolas 3 Molino 6	Residential Open space
LRT Line-6C				

Project Segment	Road Location	City	Barangay/s	Land Uses
Sucat Station to Canaynay Station	Dr. A. Santos Avenue	Parañaque	San Dionisio	Commercial Institutional Residential
Canaynay Station to El Grande Station	Dr. A. Santos Avenue	Parañaque	San Dionisio San Isidro	Commercial Institutional Residential
El Grande Station to San Antonio Station	Dr. A. Santos Avenue	Parañaque	San Isidro San Antonio	Commercial Institutional Residential
San Antonio Station to St. James Station	Dr. A. Santos Avenue	Parañaque	San Antonio BF Homes	Commercial Institutional Residential
St. James Station to Lake Front Station	Dr. A. Santos Avenue	Parañaque Muntinlupa	San Antonio BF Homes Sucat	Commercial Institutional Residential
Alabang-Zapote LRT Line				
Marcos Alvarez Station to Town Center Station	Alabang-Zapote Road	Las Piñas	Almanza Uno	Commercial Institutional Residential
Town Center Station to Madrigal Station	Alabang-Zapote Road	Las Piñas Muntinlupa	Almanza Uno Cupang Ayala-Alabang	Commercial Institutional Residential
Madrigal Station to Star Mall Station	Alabang-Zapote Road	Muntinlupa	Cupang Ayala-Alabang Alabang	Commercial Institutional

The roads traversed by the project alignments are briefly described in the succeeding sections.

3.1.1.3.1 Land Uses along the LRT Line-6A Alignment

Molino/Bacoor Boulevard

Molino or Bacoor Boulevard is a relatively new road with a northwest-southeast orientation traversing the central portion of Bacoor City. Molino Boulevard has three lanes per direction and has a center island. Its northern terminus is at the junction with Emilio Aguinaldo Highway in the vicinity of St. Dominic College and Medical Center in Barangay Talaba 4 while its southern terminus is at the junction with Molino Road in the vicinity of Southeast Asian Medical Center.

LRT Line-6A will commence at Niog Station in the vicinity of McDonald's located at the northern section of Molino Boulevard. The section between St. Dominic College and F&E De Castro Village has undeveloped private lands that presently consist of shrubland and grassland (see **Plate 3-1**). Some sections of this road segment have small commercial establishments such as restaurants, gasoline stations, and salons. A large commercial area (Vista Mall North) is being developed on the eastern side of the road before reaching the Bacoor City Hall. The LRT 6 alignment will turn from Molino Boulevard towards private properties on the east in the general vicinity of this commercial area. This general area is also the potential location of the Bacoor City Hall Station.

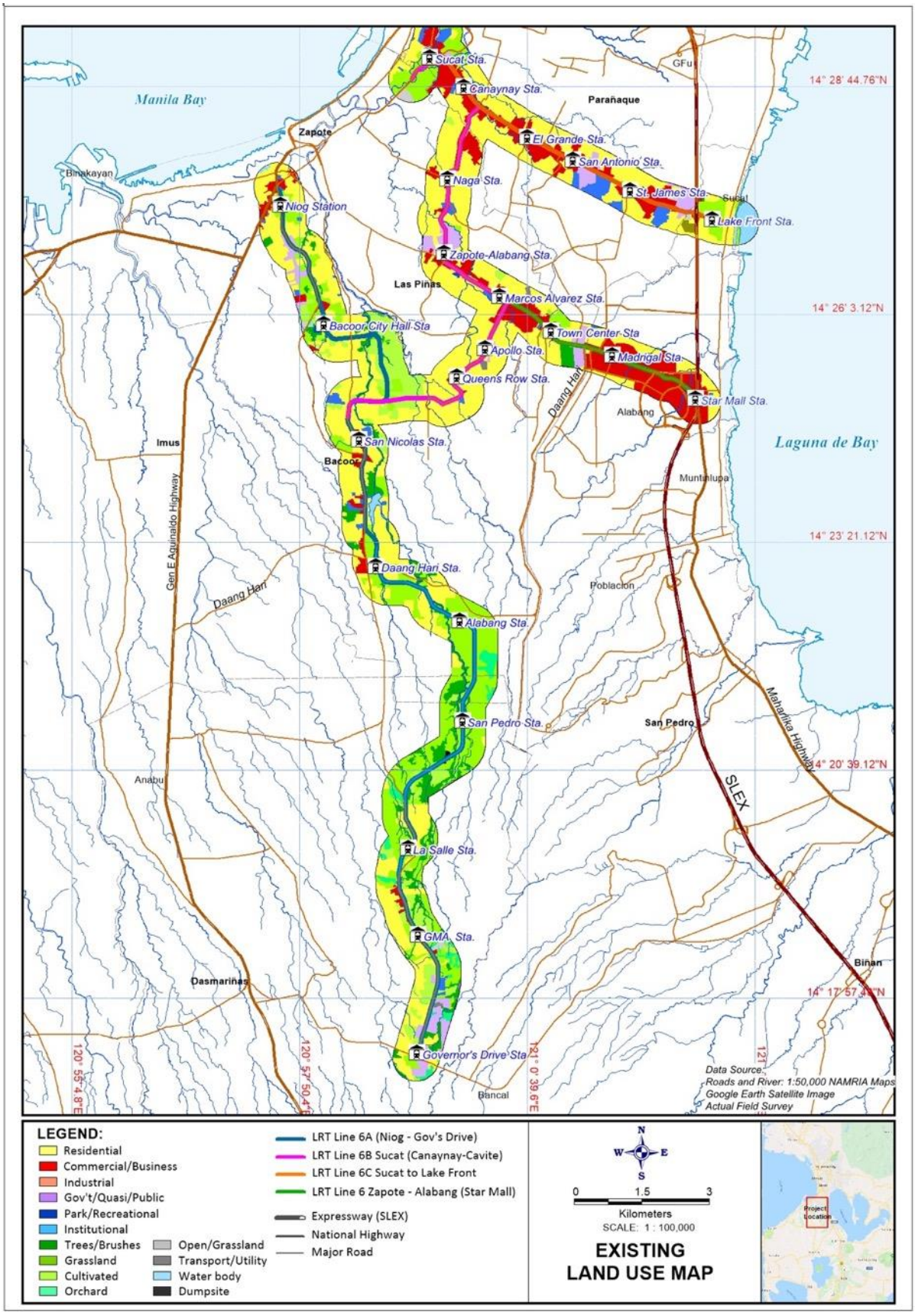


Figure 3-6. Existing Land Use Map along the Project Alignments.

Plate 3-1. Section of Molino Boulevard in the vicinity of Barangays Niog 3 and Bayanan.

Molino Road

Molino Road has a northwest-south-southeast orientation and traverses the eastern section of Bacoor. It has mostly two lanes per direction with no center island from its intersection with Aguinaldo Highway on the north to its intersection with Daang Hari on the south (**Plate 3-2**). From private properties on the east, the LRT Line-6A alignment will emerge at Molino Road in the vicinity of Barangay Molino 1. This road section is lined by small commercial establishments while the residential areas are located in the inner sections located west and east of the commercial areas. Institutional establishments along Molino Road from Barangay Molino 1 to the junction with Molino Boulevard include the Molino Doctor's Hospital, the Bacoor National High School, and the Molino 2 Barangay Hall. The RFC Molino Mall is located at the corner of Molino Road and Molino Boulevard. From this intersection, the alignment will pass through Town and Country West Subdivision, University of Perpetual Help System, Statefields School, Molino Homes, and Springville Subdivision. The project alignment will then head east towards private properties before the Daang Hari intersection in the vicinity of Camella Springville and Vista Mall Daang Hari.

Two stations of LRT Line-6A will be located on Molino Road. The San Nicolas Station will be located before the Molino Road – Molino Boulevard intersection while the Daang Hari Station will be located in the vicinity of Vista Mall Daang Hari. The Alabang and San Pedro Stations will be located within the private properties while the proposed LRT 6 depot will be located in the general area of the San Pedro Station.

Plate 3-2. Daang Hari Road is shown in the foreground while Molino Road is shown in the background.

Molino-Paliparan Road

Molino-Paliparan Road is the southern extension of Molino Road right after the Daang Hari intersection. The road terminates at the intersection with Governor's Drive in the south in the general area of Barangay Paliparan I. Molino-Paliparan Road has two lanes per direction and traverses the southernmost barangay of Bacoor City (Molino IV) and the eastern barangays of Dasmariñas City (Salawag, Paliparan III, Paliparan II, and Paliparan I). The northern section of the road has a narrow center island but most of the road sections have no center island until its endpoint at Governor's Drive (**Plate 3-3**).

The LRT Line-6A alignment will emerge at Molino-Paliparan Road from private properties on the east south of the Jose Abad Santos intersection and will traverse the road alignment until its endpoint at Governor's Drive. As the LRT Line-6A alignment emerges at Molino-Paliparan Road, the alignment will pass through the Golden City Subdivision, Salawag Barangay Hall, Avida Residences Dasmarinas, Divine School of Dasmarinas, Pintong Gubat Elementary School, Mabuhay Homes 2000 Subdivision, Paliparan Elementary School, and Dasmarinas Royale Village. The Dasmarinas Techno Park is located northeast of the Molino-Paliparan Road and Governor's Drive intersection. Commercial establishments are located on roadsides at sections from Golden City Subdivision to Salawag Barangay Hall, in the vicinity of Avida Residences Dasmarinas, at the Barangay Salawag-Barangay Paliparan III boundary, near the Paliparan Elementary School, and at the Governor's Drive intersection.

Three stations of LRT Line-6A will be located on Molino-Paliparan Road. The La Salle Station will be located near the boundary of Barangays Salawag and Paliparan III while the GMA Station will be located near the boundary of Barangays Paliparan III and Paliparan II. The Governor's Drive Station will be located near the intersection of Molino-Paliparan Road and Governor's Drive.

Plate 3-3. Molino Paliparan Road in the vicinity of La Salle Station (left) and Governor's Drive Station (right).

3.1.1.3.2 Land uses along the LRT Line-6B Alignment

Angelina Canaynay Avenue

The LRT Line-6B alignment will commence from the Canaynay Station located on Dr. A. Santos Avenue, which will be a shared station with LRT Line-6C. From the Canaynay, Station, the LRT Line-6B alignment will turn right to A. Canaynay Avenue, which is a north-south trending road with the northern endpoint at the corner with Dr. A. Santos Avenue where Liana's Supermarket is located. The southern endpoint is at the intersection with J. Tronquiao Road. A. Canaynay Avenue is a narrow four-lane road that has no center island. Small commercial establishments such as convenience stores, gasoline stations, drugstores and hardware stores are located on both sides of the road. Liana's Supermarket and Evacom Plaza are two of the larger commercial establishments located on the northern section of A. Canaynay Avenue. Access roads to Topland Subdivision and BF Martinville Subdivision are located at the southern end of A. Canaynay Avenue.

J. Tionquiao Road

J. Tionquiao Road is a short road that connects A. Canaynay Avenue with CAA Road. The road passes through the central portion of BF Martinville Subdivision. This road has three lanes and has no center island. Small commercial and industrial establishments (e.g. warehouses) are located on the roadsides.

Plate 3-4. Photo showing Tionquiao Road in the foreground and CAA Road in the background.

CAA Road

CAA Road is a north-south trending road with curved sections and is bound by J. Tronquiao Road on the north and Alabang-Zapote Road on the south. CAA Road has four lanes with no center island (**Plate 3-5**). Small commercial establishments are located along the road. Establishments that are along the alignment on CAA Road include CAA Elementary School, BF International CAA Barangay Hall, Las Piñas Doctor's Hospital, Southville International School and Colleges and Casimiro Village. Naga Station of LRT Line-6B is located on CAA Road near the intersection with Naga Road while the Alabang-Zapote Station will be located before the intersection with Alabang-Zapote Road.

Plate 3-5. CAA Road in Las Piñas City.

Marcos Alvarez Avenue

Marcos Alvarez Avenue is a northeast-southwest trending road that intersects the Alabang-Zapote Road in the vicinity of San Roque Supermarket. The road has four lanes with no center island. Commercial establishments line

the roadsides. Notable establishments along this road include the Las Piñas City Medical Center, Savemore Market, Sika Philippines warehouse, Moonwalk Village, Shopwise Express, Rainbow Village and Metrocor-B Homes. Apollo and Queen's Row Stations are located along this road.

The road turns to the southeast at the corner with San Gregorio Street and becomes Marcos Alvarez Avenue Extension. The LRT Line-6B alignment will then enter privately controlled properties in the vicinity of San Gregorio Street and will connect to the San Nicolas Station of LRT Line-6A.

Two LRT Line-6B Stations are located on Marcos Alvarez Avenue, Apollo Station near the intersection with Apollo Road, and Queen's Row Station before the intersection with San Gregorio Street (see **Plate 3-6**).

Plate 3-6. Possible locations of the Apollo (left) and Queen's Row (right) Stations along Marcos Alvarez Avenue.

3.1.1.3.3 Land uses along the LRT Line-6C Alignment

Dr. A. Santos Avenue

The entire alignment of LRT Line-6C will traverse the centerline of Dr. A. Santos Avenue, formerly known as the Parañaque-Sucat Road. This road is the primary east-west thoroughfare in Parañaque City. Its western end is at Victor Medina Street on the boundary between Barangays La Huerta and San Dionisio as the continuation of Ninoy Aquino Avenue from Pasay City in the north. The eastern end of Dr. A. Santos Avenue is the South Luzon Expressway at the city's border with Barangay Sucat of Muntinlupa City. The road is designated as National Route 63 (N63) of the Philippine Highway Network[5].

Dr. A. Santos Avenue is the main access to Barangays San Dionisio, San Isidro, San Antonio, and BF Homes. The road passes through the following large commercial establishments and subdivisions: SM City Sucat, Avida Towers Sucat, Olivarez College, Gatchalian Subdivision, Westmont Village, SM Hypermarket Sucat, Greenheights Subdivision, San Antonio Valley Homes (where the San Antonio Barangay Hall and Parañaque City Hall are located), Fourth Estate Subdivision, SM BF Paranaque, Mon-el Subdivision, BF Homes, Shopwise, Goodwill 2 Subdivision, Manila Memorial Park, and Loyola Memorial Park. **Plate 3-7** shows sections of Dr. A. Santos Avenue.

[5] https://en.wikipedia.org/wiki/Dr._A._Santos_Avenue

Plate 3-7. Sections of Dr. A. Santos Avenue near SM City Sucat (left) and Barangay San Antonio (right).

The LRT Line-6C stations include the Sucat Station in the vicinity of SM Sucat, Canaynay Station before the intersection with A. Canaynay Avenue, the El Grande Station near the intersection with El Grande Avenue, San Antonio Station before the intersection with San Antonio Avenue, St. James Station in the general vicinity of SM BF Paranaque, and Lake Front Station on Meralco Road east of the Sucat Interchange.

3.1.1.3.4 Land uses along the Alabang-Zapote LRT Line

Alabang-Zapote Road

The entire alignment of Alabang Zapote LRT Line and sections of LRT Line-6B will be on the centerline of Alabang Zapote Road (**Plate 3-8**). This is a four-lane national road with an east-west orientation that is parallel to Dr. A. Santos Avenue. The road is 10.2 km long and links Barangay Zapote of Las Piñas City to Barangay Alabang of Muntinlupa City. The Alabang-Zapote Road is heavily congested and the daily traffic volume already exceeds the road's capacity.

The Alabang-Zapote LRT Line will begin at the Marcos Alvarez Station in the vicinity of the Marcos Alvarez Avenue-Alabang-Zapote Road intersection. The alignment will pass through Barangay Almanza Uno and SM Southmall in Las Pinas City and through the commercial and business districts in Muntinlupa City (i.e., Madrigal Business Park, Molito, Westgate Alabang, Northgate Cyberzone, Filinvest City and Alabang Town Center). The alignment will terminate at Star Mall Alabang along the Manila South Road below the elevated section of the South Luzon Expressway.

Plate 3-8. Sections of Alabang-Zapote Road in Muntinlupa City (left) and Las Piñas City (right).

3.1.1.4 Key Project Impacts to Land Use

3.1.1.4.1 Change/Inconsistency in Land Use

Change in land use is not expected in areas along the project alignment that are located on the centerline of existing roads. Land use change is expected in the locations of the stations and in undeveloped areas where the alignments will pass through. This will involve the change in land use from built up or open areas/grassland to infrastructure use.

Potential conflicts with other government and private infrastructure projects can arise. At least three planned infrastructure projects have been identified along the project alignment. These projects should be considered in the final design of the project alignments.

- Flyover structures along Alabang-Zapote Road at the intersection with CAA Road and Marcos Alvarez Avenue; these projects will impact the alignment of LRT Line-6B
- Flyover structure along Molino Road at the intersection with Daang Hari (LRT Line-6A alignment)

Commercial and residential development is expected to occur in undeveloped areas near the proposed LRT 6 stations. This will be consistent with the existing development pattern along the proposed Project alignments.

3.1.1.4.2 Encroachment in Environmentally Critical Areas

The project will not encroach into environmentally critical areas (ECAs) since most of the project alignments will pass through built-up areas where there are no ECAs (see **Table 3-7**).

The nearest environmentally critical area to the Project alignment is the Las Piñas – Parañaque Critical Habitat and Ecotourism Area (LPPCHEA), also known as the Parañaque – Las Piñas Wetland Park. LPPCHEA is located about 1.4 km northwest of the LRT Line-6B+C alignment. It consists of two interconnected islands, Freedom Island and Long Island where important bird habitats such as mangroves, beach forests, lagoons, and mudflats are found. Freedom Island is an artificial island created during the construction of the Manila-Cavite Coastal Road from 1973 to 1985 while Long Island was formed by land reclamation.

The LPPCHEA was declared as a Critical Habitat through Presidential Proclamation 1412 issued on 22 April 2007 covering 175 ha of the two interconnected islands and surrounding area. It was declared as a Ramsar site under the Ramsar Convention of UNESCO on 15 March 2013. LPPCHEA was also included in the list of Philippine protected areas upon the passage of Republic Act 11038 (or the Expanded National Integrated Protected Areas System Act) on 22 June 2018.

The LPPCHEA hosts at least 41 recorded species of migratory birds that flock to the area during migration season from August to April of the following year. Among the reported bird species are the Little Egret, Black-Crowned Night Heron, and the Common Moorhen as well as the endemic Philippine Duck. The LPPCHEA also hosts one of the few remaining mangrove forests in Metro Manila with 11 reported mangrove species in the area.

3.1.1.4.3 Possible Tenurial/Land Issue

Tenurial/land issues are not expected since most of the project alignments will be on the centerline of public roads. In areas where the alignment will pass through private properties, the proponent is expected to acquire affected private properties along the right of way, except in areas where privately controlled properties will be affected.

3.1.1.4.4 Impact on Visual Aesthetics

The proposed railway project can affect visual aesthetics along the project alignments. Improperly managed and unscreened construction sites, staging areas and construction camp can become an eyesore for local residents.

During project operation, the overhead structure as well as the overhead electrical wiring can cause negative visual impacts and can become a concern for local residents.

Table 3-7. ECA Categories Traversed by the Project Alignments.

ECA Categories	Project Falls within ECA Description	Remarks
A. All areas declared by law as national parks, watershed reserves, wildlife preserves, and sanctuaries	No	The project is not located within a protected area declared under the NIPAS Law.
B. Areas set aside as aesthetic potential tourist spots	No	
C. Areas which constitute the habitat of any endangered or threatened species of indigenous Philippine wildlife (flora and fauna)	No	
D. Areas of unique historic, archaeological, geological or scientific interests	No	The project site is not within this ECA category.
E. Areas which are traditionally occupied by cultural communities or tribes	No	There are no known ancestral domains in the project site.
F. Areas frequently visited and/or hard-hit by natural calamities (geologic hazards, floods, typhoons, volcanic activity, etc.)	**Yes**	The project site is located in an area affected by at least 2 typhoons annually.
G. Areas with critical slope	No	The topography in the project site ranges from flat to gently rolling.
H. Areas classified as prime agricultural lands	No	The project site is mostly covered with brush, shrubs, trees, and grass.
I. Recharge areas of aquifers	No	
J. Water bodies characterized by one or any combination of the following conditions: tapped for domestic purposes; within the controlled and/or protected areas declared by appropriate authorities; which support wildlife and fishery activities.	No	
K. Mangrove areas characterized by one or any combination of the following conditions: 1. with primary and pristine and dense young growth 2. adjoining mouth or major river system 3. near or adjacent to traditional productive fry or fishing grounds 4. which acts as natural buffers against shore erosion, strong winds, and storm floods 5. on which people are dependent for their livelihood, pursuant to and taking into consideration RA No. 7161 which prohibits the cutting of mangrove species	No	
L. Coral reefs characterized by one or any combination of the following conditions: 1. with 50% and above live coralline cover 2. spawning and nursery grounds for fish 3. which act as a natural breakwater of coastline	No	

3.1.1.4.5 Devaluation of land value as a result of improper solid waste management

Devaluation of land value can occur if solid waste is not managed properly during the construction phase.

The project is expected to generate the following solid wastes during the pre-construction, construction and operation phases:

Project Phase	Expected Wastes	Waste Type
Pre-construction	Excavated soils	Reusable
	Removed plant materials	Biodegradable
	Rubble from demolished structures along the project alignment	Reusable/ residual
Construction	Building materials such as wood, plaster, scrap metal, cement, insulation materials, electrical wiring, roofing, etc.	Reusable/ residual
	Domestic wastes generated by workers and construction personnel	Recyclable/ reusable/ biodegradable
	Hazardous wastes such as fuel, lube oil sludge, bulbs, oily rags, etc.	Hazardous
	Damaged vehicle and equipment parts	Recyclable
Operation	Paper, plastic, boxes/cartons and food wastes from offices	Recyclable/ biodegradable
	Hazardous wastes such as busted fluorescent lamps/bulbs, used batteries, electronic wastes	Hazardous

Per capita waste generation during the construction phase is estimated at 0.6 kg/day. With about 3,000 workers, daily waste generationduring the construction phase is estimated at 1,800 kg or 1.8 tons while daily waste generation during the operation phase is estimated at 720 kg with about 1,200 workers.

Wastes that will be generated during the various project phases will be classified as biodegradable, recyclable/ reusable, hazardous and residual wastes. Biodegradable wastes will be composted whenever feasible while recyclable and reusable wastes will be recovered and sold to recyclers. Excavated soils will be reused in the various construction activities along the project alignment. Hazardous wastes will be stored separately in sealed containers and will be disposed through accredited hazardous wastes transporters and treaters. Residual wastes will be disposed through the solid waste collection system of the host LGUs.

The project proponent and its contractor/s will formulate and implement a Solid and Hazardous Wastes Management Plan that will focus on the following (after JICA 2018):

- Acquisition of adequate quantities of construction materials to avoid wastage
- Reuse of excess construction materials for other infrastructure projects within the host LGUs
- Provision of labeled (recyclables, biodegradables, hazardous, residual wastes) and adequately sized waste bins
- Implementation of waste segregation in all construction sites
- Coordination with LGU for regular waste collection

3.1.2 Geology/Geomorphology

The main objectives of this study are:

- To describe the existing geologic conditions of the sites and the surrounding areas;
- To identify possible geologic hazards that may pose threats to the proposed LRT infrastructures or may be induced by the project development;
- To recommend mitigating measures to minimize if not totally eliminate the identified hazards and risks.

Approach and Methods

The evaluation of the proposed alignment and surrounding sites for the LRT lines and stations was conducted through fieldwork and desktop studies. Visual observations were done during the fieldwork conducted on 29 April 2019. Information on the lithologies, local topography, geohazard were gathered and verified. Handheld GPS and base maps were used during the on-site visit.

The available geological, geohazard, elevation data were then converted and integrated into GIS database to facilitate the assessment.

Secondary data were sourced from published reports, maps, and on-line researches from the following:

a. Tectonic, active faults, seismicity, geohazard maps from the Department of Science and Technology - Philippine Volcanology and Seismology (DOST-PHIVOLCS);
b. Geological and hazard maps covering Metro Manila, and Cavite from the Mines and Geosciences Bureau (MGB), Metropolitan Manila Earthquake Impact Reduction Study (MMEIRS) and other related published reports;
c. The 1:50,000 scale topographic maps of Muntinlupa, and Cavite City quadrangles from National Mapping and Resource Information Authority (NAMRIA);
d. Google Earth satellite imagery of the sites;
e. Sub-surface geological information based on available geotechnical reports in the vicinity of the project sites.

3.1.2.1 Regional Geology

Tectonic Setting

The tectonic setting (**Figure 3-7**) of the Philippine Archipelago is influenced by the convergence of the Eurasian Plate and Philippine Sea Plate. Along the eastern side, the Philippine Sea Plate subducts westward and is marked by the Philippine and East Luzon Trenches. Along the western side, the Eurasian Plate is being consumed by the east-dipping Manila, Negros, and Cotabato Trenches. The on-going convergence in the archipelago is manifested by the Philippine Fault Zone, a 1,200 km length deformation from northwest Luzon to northeast Mindanao.

Stratigraphy

The central axis of Metro Manila is predominantly underlain by the volcanic and sedimentary deposits of Guadalupe Formation. It is composed of the lower Alat Conglomerate and upper tuffaceous member known as the Diliman Tuff. The lower Alat Conglomerate member is composed of massive and poorly sorted sequence of conglomerate, sandstone and mudstones. The upper Diliman Tuff is made up of pyroclastic rocks, tuff, and welded pyroclastic breccias.

Taal Pyroclastics is composed of Pleistocene volcanic ash deposits widely distributed in Cavite, Batangas and Laguna presumed to be the eruptive products of Taal Volcano. It consists of thinly laminated white ash and black cinder (Peña, 2008).

Alluvium deposits occupy the coastal, floodplain, and lowland areas of Metro Manila and Cavite. It consists of beach, lagoonal, estuarine, and deltaic deposits.

The regional stratigraphy is summarized in **Table 3-8**.

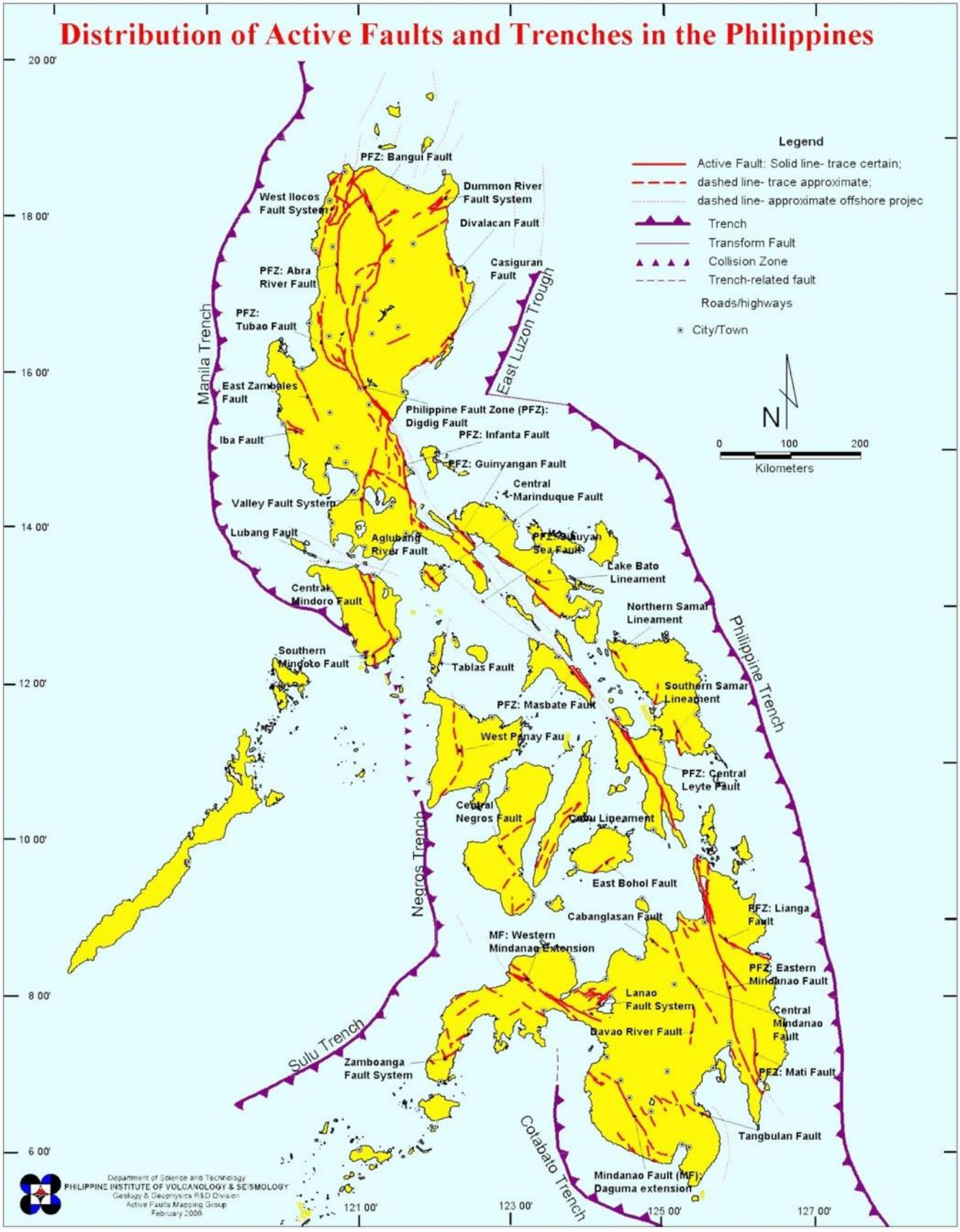


Figure 3-7. Tectonic map of the Philippines showing the major fault systems and trenches (DOST-PHIVOLCS, 2000).

Table 3-8. General Stratigraphy of Metro Manila and Northern Cavite.

Age	Formation	Description
Holocene	Quaternary Alluvium	Alluvial deposits of beach, lagoonal, estuarine, and deltaic consisting of unconsolidated clay, silt, sand and boulders.
Pleistocene	Guadalupe Formation	Upper Diliman Tuff member consisting of pyroclastic rocks, tuff, welded pyroclastic breccias. Lower Alat Conglomerate member composed of sequence of conglomerate, sandstone and mudstones. It is massive and poorly sorted. The sandstone and mudstone interbeds are tuffaceous.
	Taal Pyroclastics	Volcanic ash deposits from Taal Volcano

Structural Geology

The regional structural features in the Philippines as shown in **Figure 3-8** are generally associated with subduction zones, faults and the Philippine Fault System. The following geologic structures are the seismic generators that may affect the project site.

The **Valley Fault System** has been considered as a potential strong earthquake generator particularly in Metro Manila. It is composed of two oppositely dipping faults: West Valley Fault (WVF) and East Valley Fault (EVF). The WVF is about 100 km long and passes through north of Montalban in western Rizal, and the cities of Marikina, Pasig, Muntinlupa, and Cavite in eastern Dasmariñas. The EVF is estimated to be 10 km long and its trace extends from San Rafael, Montalban and Pasig area. Based on empirical relationship between magnitude and rupture length, it is estimated that the 100-km long West Valley Fault is capable of generating a magnitude 6.0 to 7.0 earthquake.

The **Lubang Fault** is an active strike-slip fault and is located offshore north of Mindoro Island. It is considered as an eastward extension of the Manila Trench. PHIVOLCS considered it to have a lower potential for generating destructive earthquakes due to periodic release of stress

Central Mindoro Fault is a northwest trending fault transecting the central length of Mindoro Island marking the boundary of the western highlands and eastern lowlands.

Aglubang River Fault a northeast trending fault located in Mindoro Island. It appears to be associated with the Central Mindoro Fault.

The **Philippine Fault System** is a left-lateral strike slip northwest-trending fault zone whose branches have been mapped for 1,200 km from the eastern part of Mindanao to northern Luzon. This fault is the biggest structural element whose seismic activity is also among the most destructive in the country. Large historic earthquakes associated with this fault are the 1973 Ragay Gulf earthquake and the 1990 Luzon earthquake.

Infanta Fault is one of the splays of the Philippine Fault along its northwest segment in the central portion of the Central Philippines.

The **Manila Trench** is one of the most seismically active and major tectonic feature that greatly influences the geology, volcanism and seismic activity in the central part of west Luzon. The trench marks the collision of the South China Sea with the Luzon landmass causing the oceanic crust to subduct under Luzon Island producing the volcanic chain on the western coast of Luzon including Bataan, Pinatubo, Corregidor and Taal volcanoes. It extends from the northern coast of Luzon, near Taiwan, down to the western coast of Mindoro and Panay where it merges with thrust faults on land and offshore. A branch of the structure appears to verge into the northern

shores of Mindoro, along the Verde Island Passage and is known as Lubang Fault on its western end. This structure appears to extend further east into the Verde Island Fault.

3.1.2.2 Regional Geomorphology

The Metro Manila region is divided into three major general physiographic zones: the Coastal Margin, the Diliman-Guadalupe Plateau and the Marikina-Laguna lowlands.

The Coastal Margin refers to the Manila Deltaic Plain, formed by Pasig River delta, backmarsh and reclaimed areas. It extends from Manila to Pasay City with the deltaic plain coalescing with the beach and lagoonal deposit of Parañaque and the estuarine, beach and sand bar deposits of Caloocan City and Malabon (Gervasio, 1968). The deltaic plain extends to the areas in Manila, western part of Mandaluyong and Pasay City. The deposition results to the progressive accumulation and subsequent piling up of transported sediments due to the coalescing of the deltas. The delta deposit is estimated to be about 70 meters thick along the coast and tapers landward (Gervasio, 1968). It consists of sand, pebbly gravel, silt, mud and clay of various colors and plasticity. It conformably overlies the tuffaceous Guadalupe Formation. Ground elevation ranges from 0m to 5m.

The Guadalupe Geomorphic Plateau is a topographic high and is a dominant physiographic feature of the central portions of Metro Manila. The plateau separates the coastal margin of Manila from the western region of the Marikina-Laguna de Bay Lowlands forming the elevated backbone of Metro Manila. This north-south trending topographic high extends from Novaliches in the north to Parañaque in the south and becomes narrower in Pasig River. Elevation ranges from 20m to 100m and gradually becomes lower towards the west.

Marikina-Laguna Lowlands consists of flood plains along the Marikina River and a delta along the Laguna de Bay. Elevation ranges from 2m to 30m.

Cavite forms part of the Taal Ignimbrite Field that defines the sequence of Quaternary pyroclastic deposits predominant in the region including Laguna. The northwestern side of Cavite, however, is characterized by coastal tidal flats. The lowland areas include Cavite City and Bacoor.

Figure 3-8 shows the geomorphologic features that form Metro Manila and part of northern Cavite.

3.1.2.3 Site Geology

Topography

The topography varies from flat in the northern and coastal areas to undulating towards the upland areas of Cavite in the south (**Figure 3-9**). The northern portion of the project site is situated in the south-central portion of the Guadalupe Plateau geomorphic terrain. The Guadalupe Plateau forms the low ridge that separates Laguna de Bay to the east and Manila Bay to the west. The central and southern portions of the project site lie on the lowland and undulating to hilly areas of Cavite. Elevation ranges from 5m to 180m asl (5m in Bacoor side to 180m in Dasmariñas, Cavite). Line 6B elevation is 8m to 35m, Line 6C from 10m to 25m and Alabang-Zapote line from 20m to 30m.

Hydrology

There are few rivers and several intermittent creeks that are situated near the LRT 6 lines and stations. Sections of these waterways are to be transected by the LRT 6 lines. The drainages slope towards the north and west and drain to the marshes and finally to Manila Bay.

Bedrock Lithology

The LRT alignments are underlain by Alluvial deposits, Guadalupe Formation and Taal Pyroclastics based on the geological map from PHIVOLCS and MMEIRS (**Figure 3-10**).

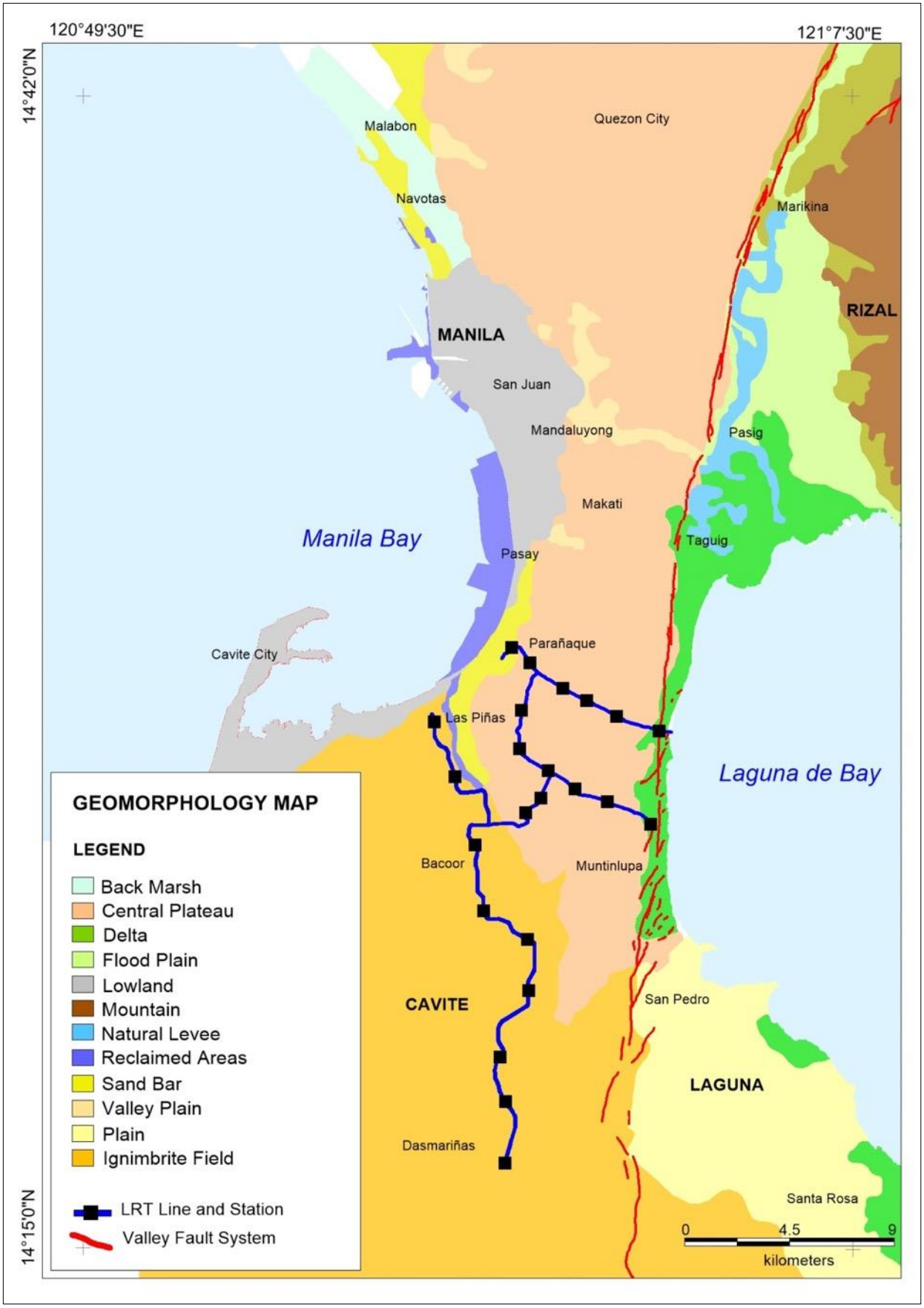


Figure 3-8. Geomorphologic features of Metro Manila and vicinity.

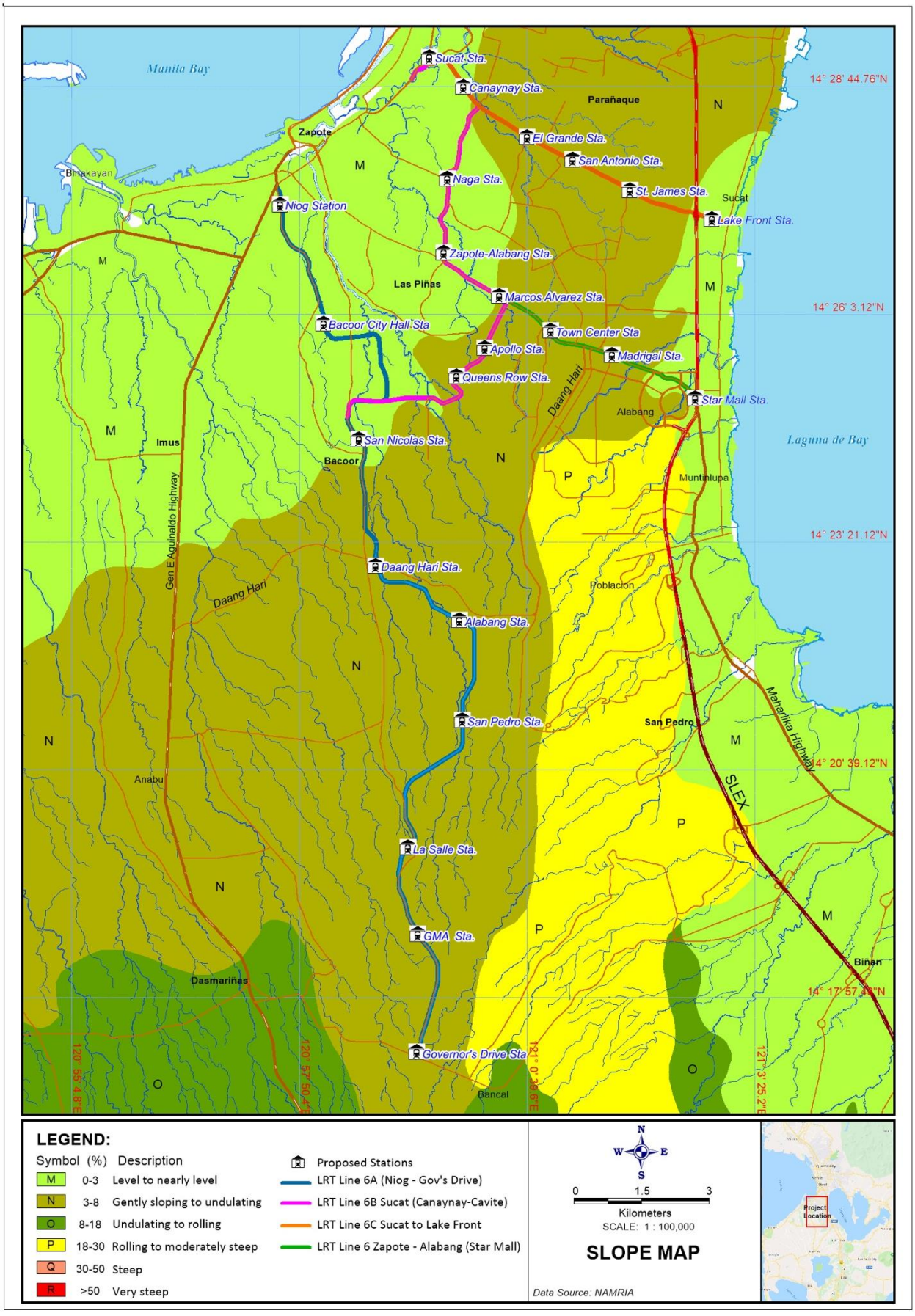


Figure 3-9. Slope map of the LRT 6 project alignments.

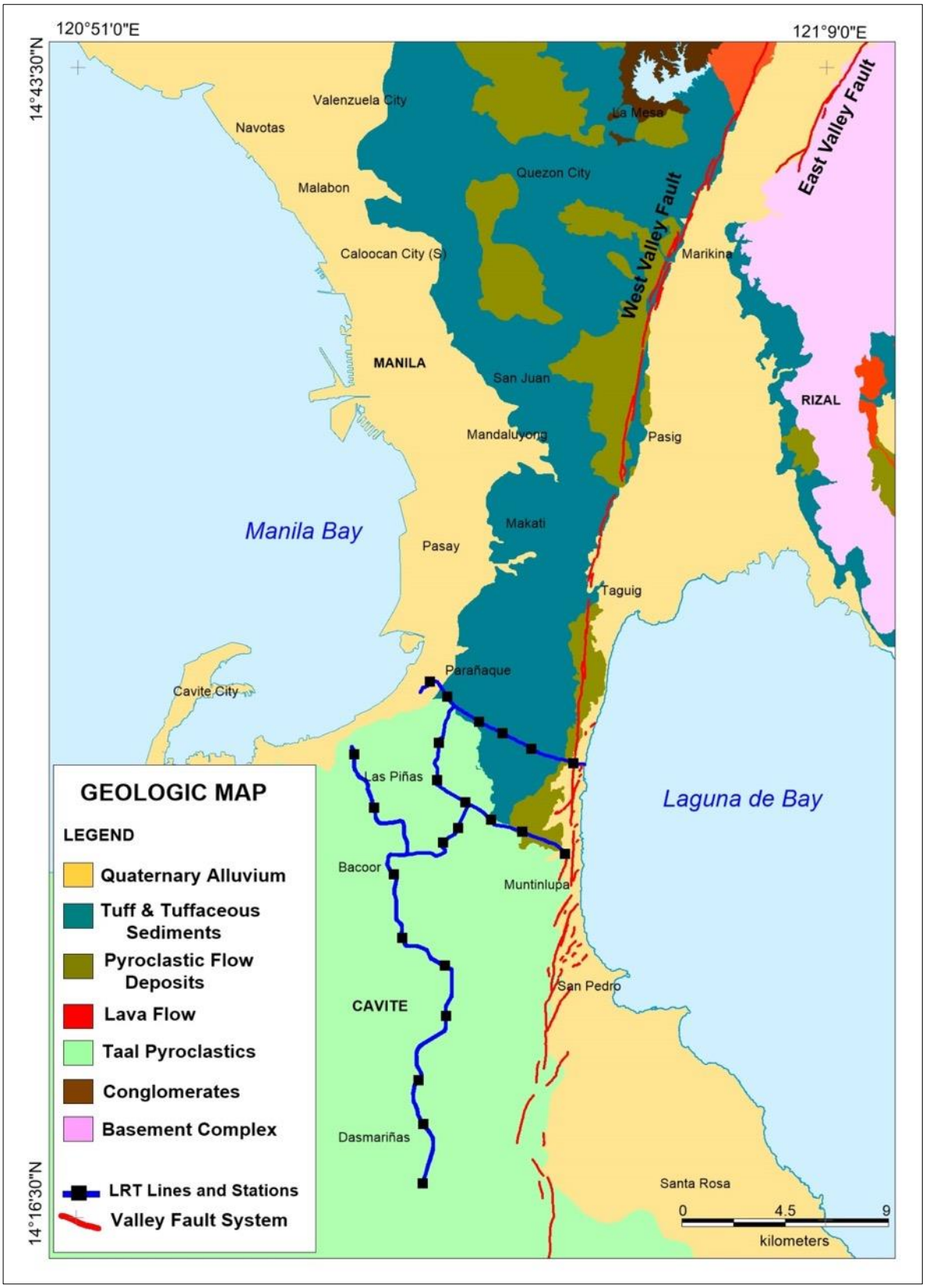


Figure 3-10. Geologic map of Metro Manila, northern Cavite and surrounding areas (Modified from PHIVOLCS and MMEIRS).

The northern part of the project site which corresponds to Line 6C is largely underlain by tuff and tuffaceous deposits of Guadalupe Formation. Towards the east, a narrow section is underlain by pyroclastic flow and alluvial deposits near the Laguna de Bay.

Line 6B in its northern segment is partly underlain by alluvium and tuff. The formation changes to Taal Tuff as the alignment veers southward.

The lithology underlying Line 6A is predominantly composed of volcanic ash deposits belonging to Taal Pyroclastics.

The Alabang-Zapote line consists of Tuff Pyroclastics in the western side and changes to pyroclastic flows towards the east. It is partly underlain by alluvium around the proposed Starmall Station.

Surficial Deposits

The LRT Lines 6B, 6C and Alabang-Zapote will be built along the urbanized areas covered mostly by concrete basement, pavement and buildings. Line 6A will similarly traverse built-up areas but the alignment will pass through several vacant lots and fields. Surface deposits in open areas include soil, pebbles and boulders derived from alluvial deposits and weathered underlying pyroclastics and tuffaceous sediments.

Structural Features

In Metro Manila, the prominent geologic structure is the Valley Fault System consisting of two sub-parallel faults dipping to each other: West Valley Fault (WVF) and East Valley Fault (EVF). The 100 km long WVF, as discussed, passes through the eastern side of the project alignments. Its trace extends in several municipalities and cities including Montalban, Marikina, Pasig, Muntinlupa, and Cavite in eastern Dasmariñas. It traverses the eastern side of the project alignments and is nearest to the eastern side of Line 6C about 55 m from Lakefront Station.

3.1.2.4 Geohazard Assessment

Site assessment of the locations of the project alignments have identified the following geologic hazards while the Geological Site Scoping Report (GSSR) of the Mines and Geosciences Bureau Region IV-A Office is presented in **Appendix 11**.

3.1.2.4.1 Seismic Hazard

The presence of several active tectonic structures that bounds northern Philippines contributes to its vulnerability to seismic events. This includes the following seismic generators: (1) Valley Fault System; (2) Lubang Fault; (3) Central Mindoro Fault; (4) Aglubang River Fault; (5) Philippine Fault Zone; (6) Infanta Fault and (6) Manila Trench.

The VFS being the closest active fault to the project site is the most likely near-field source for damaging earthquakes. The southern extension of the West Valley Fault passes east of the LRT 6 alignments. It is about 48 m away from the Lakefront Station (see PHIVOLCS certification in **Appendix 12**) and transects the eastern end of the LRT 6C alignment.

Ground Acceleration

Ground shaking effects that resulted from a seismic event is measured by peak ground acceleration (PGA). A joint study conducted by PHIVOLCS and the Unites States Geological Survey (USGS) estimated peak ground acceleration in the Philippines that evaluated the distance-dependent distribution of earthquakes. The intensity and severity of the effects of the earthquake to the site relates to the distance of the epicenter, depth and length of surface rupture. The seismic energy attenuation relation used was that of Fukushima and Tanaka (1990) described for Japan and has been applied to western Pacific Island settings (Thenhaus et al., 1994). Results indicated PGA with a 10% probability of being exceeded in 50 years for rock and soil conditions (see **Figure 3-11, Figure 3-12** and **Figure 3-13**).

Daligdig and Besana (1993) conducted a more detailed analysis of seismic hazards for Metro Manila assessing the probable level of ground shaking given the worst case scenario generated by the Valley Fault System). The result indicated a hypothetical magnitude 7.5 earthquake, a surface rupture of about 70 km and a displacement in the order of 3 to 5 meters. The PGA values may reach up to 1.0g within the epicentral area where the substrate is dominantly soft soils and PGA value of 0.4g in bedrock (see **Table 3-9**).

The southern extension of the West Valley Fault passes east of the project alignments making the project sites vulnerable to strong ground shaking during earthquakes. It is about 55 m away from the Lakefront Station and transects the eastern end of the allignment.

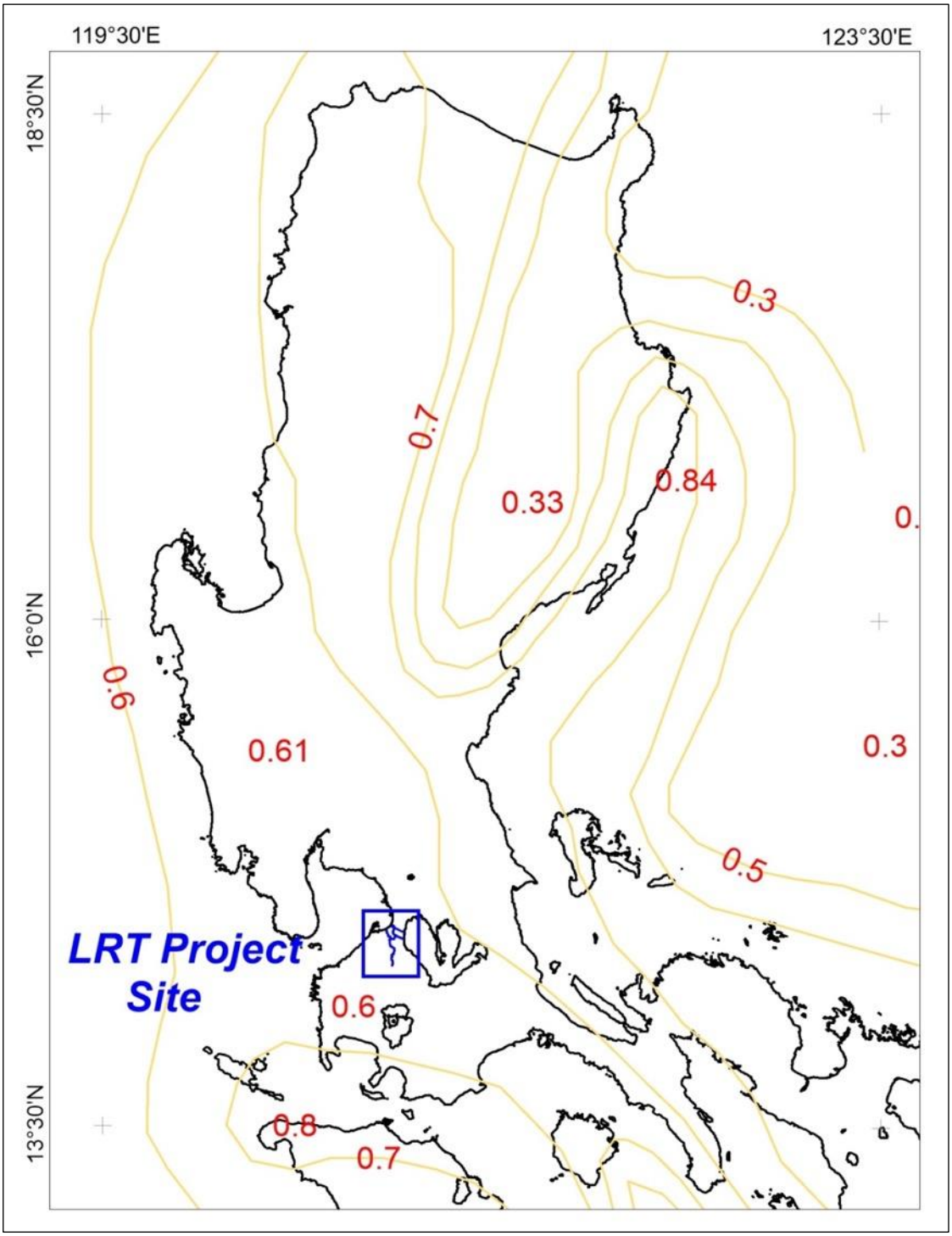


Figure 3-11. Map showing the PGA values for soft soil conditions in Luzon based on Thenhaus, et al (1994).

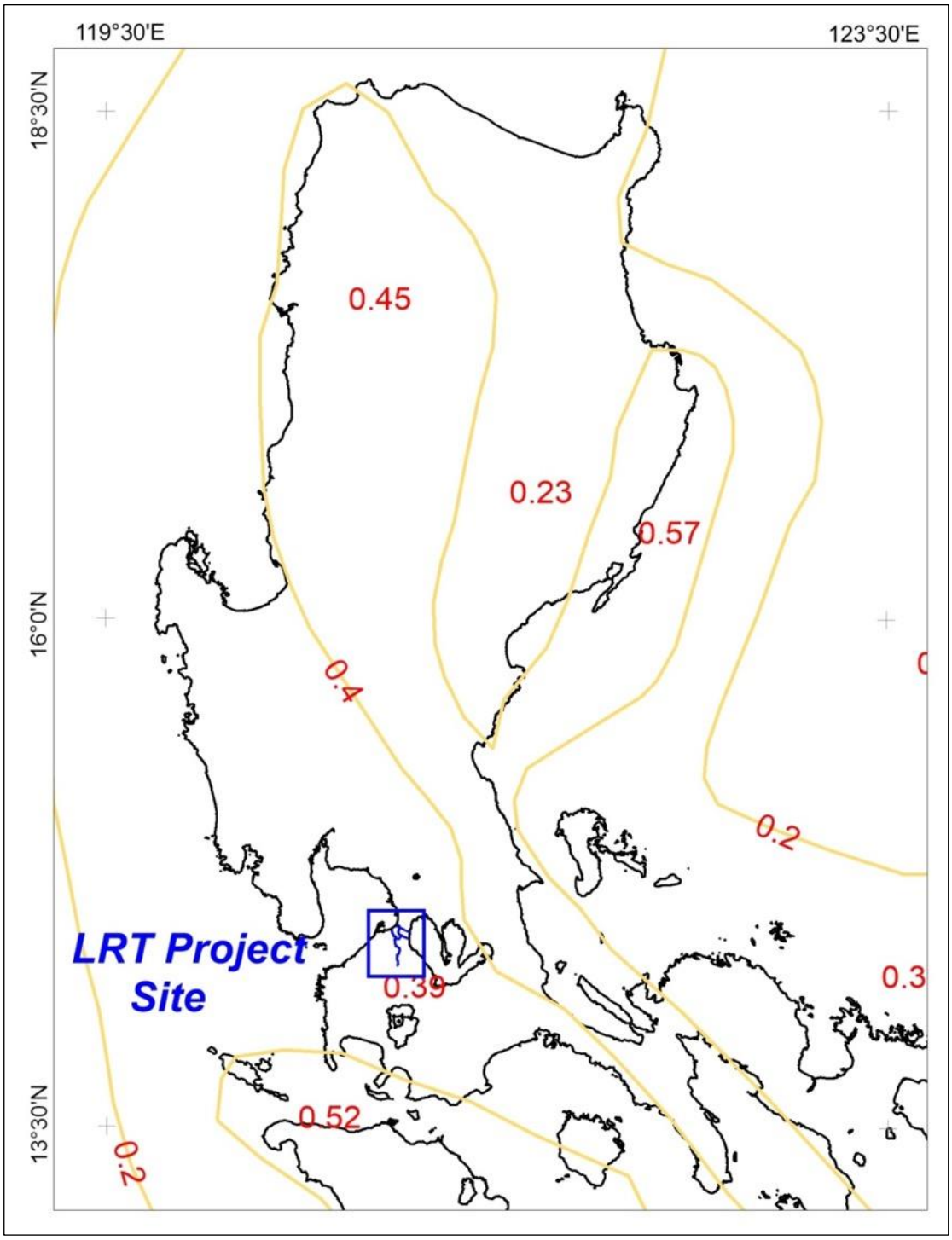


Figure 3-12. Map showing PGA values for medium soil conditions in Luzon based on Thenhaus, et al (1994).

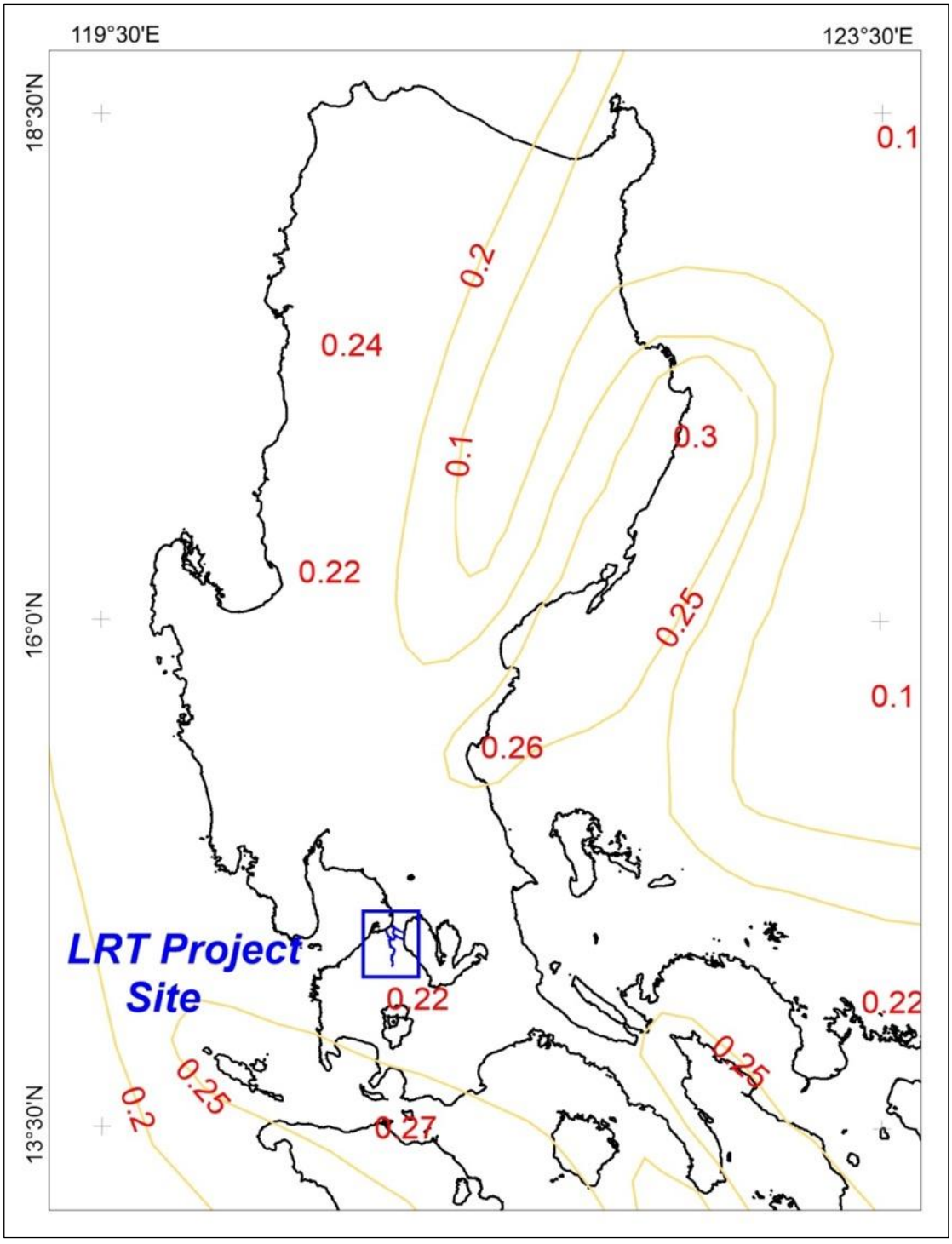


Figure 3-13. Map showing the PGA values for rock conditions in Luzon based on Thenhaus, et al (1994).

For the calculation of PGA in the study area, the potential maximum magnitude (**Table 3-10**) that can be generated by fault structures was computed using the magnitude-rupture length relationship empirically derived by Wells and Coppersmith (1994). **Table 3-11** summarizes the PGA values for different rock and soil conditions at the sites. The results indicate the highest PGA values of 0.21g, 0.17g, and 0.09g for alluvial deposits, tuff, and pyroclastics underlying the LRT 6 lines, respectively. The PGA values are calculated from Valley Fault System owing to its near distance to the LRT 6 lines.

Table 3-9. Areas vulnerable to strong ground shaking in Metro Manila (after Daligdig and Besana, 1993).

Possible Level of Ground Shaking	Areas
Above Average	Manila proper inclusive of reclaimed areas along Manila Bay, the municipalities of western Malabon, Navotas, eastern Pateros, Marikina (valley side) and the eastern section of Pasig
Average	Pasay City, western portion of Makati, northeastern and eastern Quezon City (within the Marikina Valley), the extreme southwestern part of Caloocan City, eastern Malabon, western section of Valenzuela, the coastal and northern portions of Parañaque and Las Piñas and the lakeshore areas of Taguig and Muntinglupa
Below Average	Areas within the Diliman Plateau (Guadalupe Plateau)

Table 3-10. Calculated earthquake magnitude for each seismic generator.

Seismic Generator	Approximate Length (km)	Potential Maximum Magnitude at Fault Rupture
Valley Fault System West Valley Fault	100	7.4
Lubang Fault	127*	7.5
Central Mindoro Fault	115*	7.5
Aglubang River Fault	43*	6.9
PFZ: Infanta Fault	125*	7.5
Manila Trench	950*	8.5

*Length is estimated from the Distribution of Active Faults and Trenches Map of PHIVOLCS and Google Earth

Table 3-11. Peak Ground Acceleration values for rock and soil conditions at the project site.

Seismic Generator	Distance from site (km)	Magnitude	%g	Peak Ground Acceleration (PGA)			
				Rock	Hard Soil	Medium Soil	Soft Soil
Valley Fault System		7.4					
Lubang Fault	83*	7.5	0.104	0.06	0.11	0.09	0.15
Central Mindoro Fault	95*	7.5	0.086	0.05	0.09	0.08	0.12
Aglubang River Fault	98*	6.9	0.053	0.03	0.06	0.05	0.07
PFZ: Infanta Fault	60*	7.5	0.154	0.09	0.17	0.13	0.21
Manila Trench	950*	8.5	0.065	0.04	0.07	0.06	0.09

*Distance from project site is estimated from the map of PHIVOLCS (2000) and Google Earth.

Ground Rupture

Ground rupture is the surface displacement along the fault. It is a destructive hazard that affects structures situated within the fault traces.

The distances of LRT Line-6A, LRT Line-6B and Alabang-Zapote LRT Line from WVF suggests that risk of ground rupture is low (**Figure 3-14**). The eastern side of LRT Line-6C traverses the West Valley Fault and structures (columns/posts) that will be built must be away from the trace of the fault. The recommended minimum buffer zone of PHIVOLCS is at least 5 meters from the fault trace of from the edge of deformation area.

Figure 3-14. Ground rupture map of Metro Manila showing the West Valley Fault on the eastern side of the project site.

Liquefaction

Areas underlain by unconsolidated deposits in the coastal areas of Metro Manila, Bacoor, Parañaque and Muntinlupa are vulnerable to liquefaction (**Figure 3-15**). These liquefiable materials can reduce the strength of the subsurface layers and affect the integrity of the above structures.

Among the project alignments, the northwestern part of Line-6A from Niog Station to San Nicolas Station, the northwesternmost section of Line-6C in the general area of Sucat Station, and the easternmost section of Line-6C in the general area of Lakefront Station are susceptible to liquefaction (**Figure 3-15**).

Geotechnical reports of projects near the Lakefront Station of Line-6C indicate the presence of unconsolidated materials about 13 m thick in this area. Other geotechnical features include the following: (1) Plasticity of the upper 9m is low; (2) Depth to water table is 2.91 (shallow); (3) SPT is 30 or more; (4) Materials in the upper section is liquefiable and those at deeper levels are more competent.

Figure 3-15. Liquefaction map. Modified from DOST-PHIVOLCS, 2018.

Differential Settlement (Fault related)

The unconsolidated alluvial deposits along the coastal, lakeshore and lowland areas may likewise be susceptible to settlement if sediments undergo expansion, contraction or movement. Changes in the soil condition brought by drought, flooding, earthquake, vibration and broken facilities contribute to settlement.

Settlement causes cracks in the foundation and uneven settling of the structures, tilting and displacement. It can be addressed, however, as early as before the construction phase by determining the soil properties. Ideally, the soil at the site should be non-expansive, i.e., it should contain little amount of silt and clays. In areas where soil is tuff, settlement may also occur as the result of the elastic deformation of the tuff in the subsurface.

The northwestern side of LRT Line-6A and both ends of LRT Line-6C traverse areas underlain by loose alluvial deposits. It is therefore recommended to conduct a geotechnical investigation to determine the expansive capacity of the soils in these areas.

Earthquake-induced Landslides

Generally, the LRT lines are not susceptible to landslides that may occur during or after earthquakes. The locations of the alignments are located mostly in low-relief areas and flat to gently undulating topography.

3.1.2.4.2 Mass Movement Hazards

Landslide

There is low susceptibility to landslide in the gently sloping areas of Bacoor and Dasmariñas traversed by the central and southern segments of LRT Line-6A. The northern side of the project site has low relief and flat topography and is thus not vulnerable to landslide.

Subsidence

Subsidence is the accelerated sinking or gradual settling of the land surface. It can be caused by natural events (i.e., earthquakes, soil compaction, erosion etc.) or human activities (i.e., groundwater extraction, pumping etc.).

Figure 3-16 is a Persistent Scatterer Interferometric Synthetic Aperture Radar satellite data analyzed by Lagmay (2011) and Eco et al (2013) in verifying the subsidence over Metro Manila and nearby areas. The study showed that the proposed reclamation areas are subjected to up to 6 cm/y. Caloocan, which is an industry hub that draws large volumes of groundwater subsided by 8cm/yr in 2004 and 2005 (Rodolfo, 2014). In southern Metro Manila the areas with high subsidence rate corresponds to the built-up areas in Muntinlupa, Las Piñas, Rosario, and Dasmariñas City. Some areas with subsidence rates $\leq$10 mm/yr are also situated in residential/commercial spaces.

The cause of the subsidence is attributed to over extraction of groundwater, as the need in the water supply to support livelihood (fishponds in Caloocan, Navotas and nearby areas), industrial operations and personal use continuously grow.

Lagmay (2011) noted that there is absence in lowering of the ground surface in Quezon City, Makati, Mandaluyong and Pasay. The areas are underlain by adobe, coherent rock compared to coastal deposits, which causes the ground from sinking despite overpumping of groundwater.

The alluvial plains underlain by loose deposits are vulnerable to subsidence. However, the impact in land subsidence by the proposed LRT lines alone in the surrounding areas is considered low and in case of occurrence is not extensive. Issues on subsidence can be addressed in the geotechnical study and proper engineering planning.

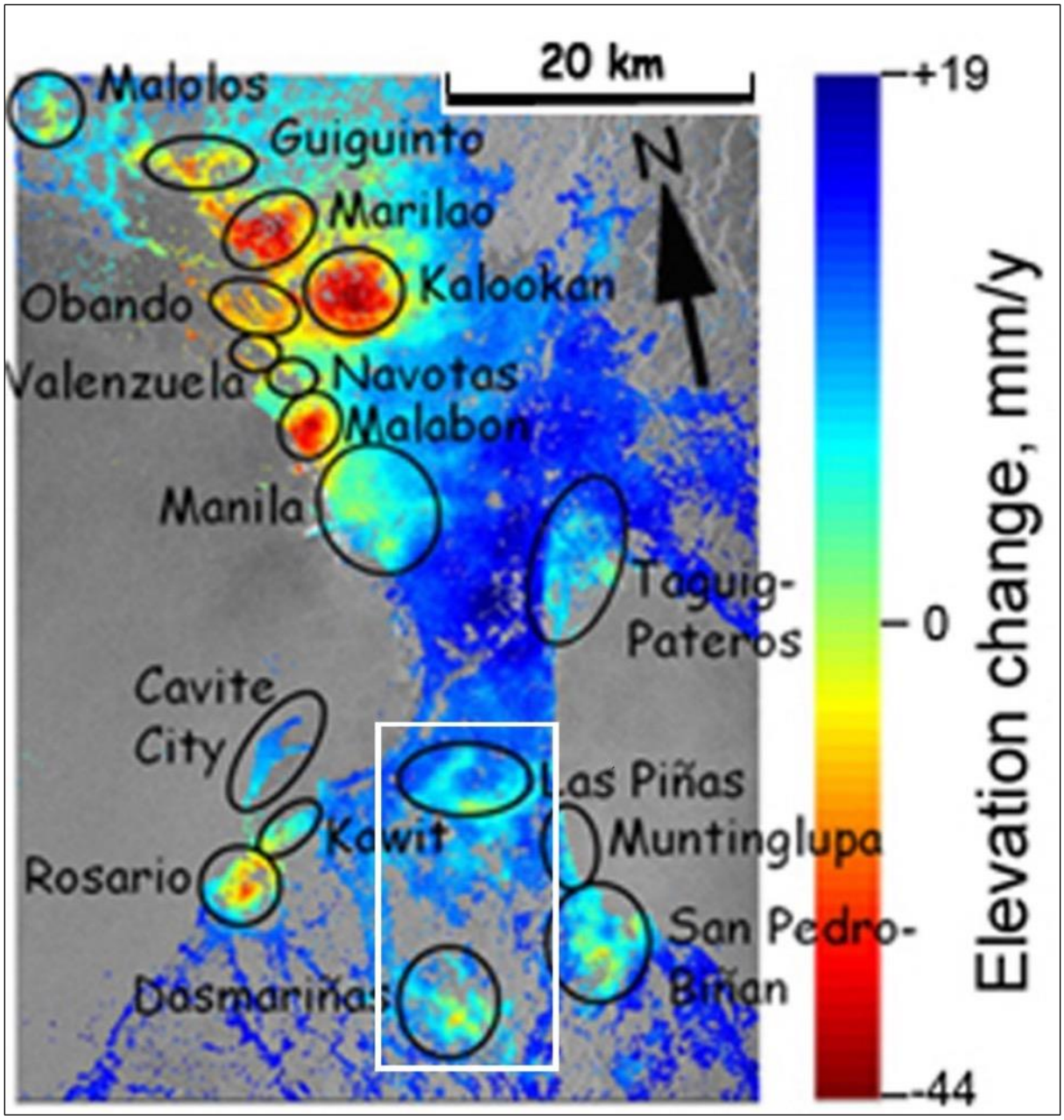


Figure 3-16. Satellite-borne Permanent Scatterer Interferometric Synthetic-Aperture Radar (PSInSAR) subsidence data over Metro Manila and northern Cavite[6].

3.1.2.4.3 Hydrological Hazard

Flooding

Figure 3-17 shows the composite flood and landslide map from MGB (2016). Most of the vulnerable to flood are the alluvial, deltaic and coastal plains along Manila Bay and Laguna de Bay. Inland, areas near rivers are susceptible to inundations.

Generally, the LRT alignments are situated in low flood susceptibility areas, except for the northwestern segment of LRT Line-6C which will traverse moderately flood prone locations.

[6] From Lagmay (2011) and Eco et al. (2013). Project site is located within the white rectangle. LRT lines 6A, 6B and Alabang-Zapote traverse will some areas with identified subsidence around 10 mm/yr.

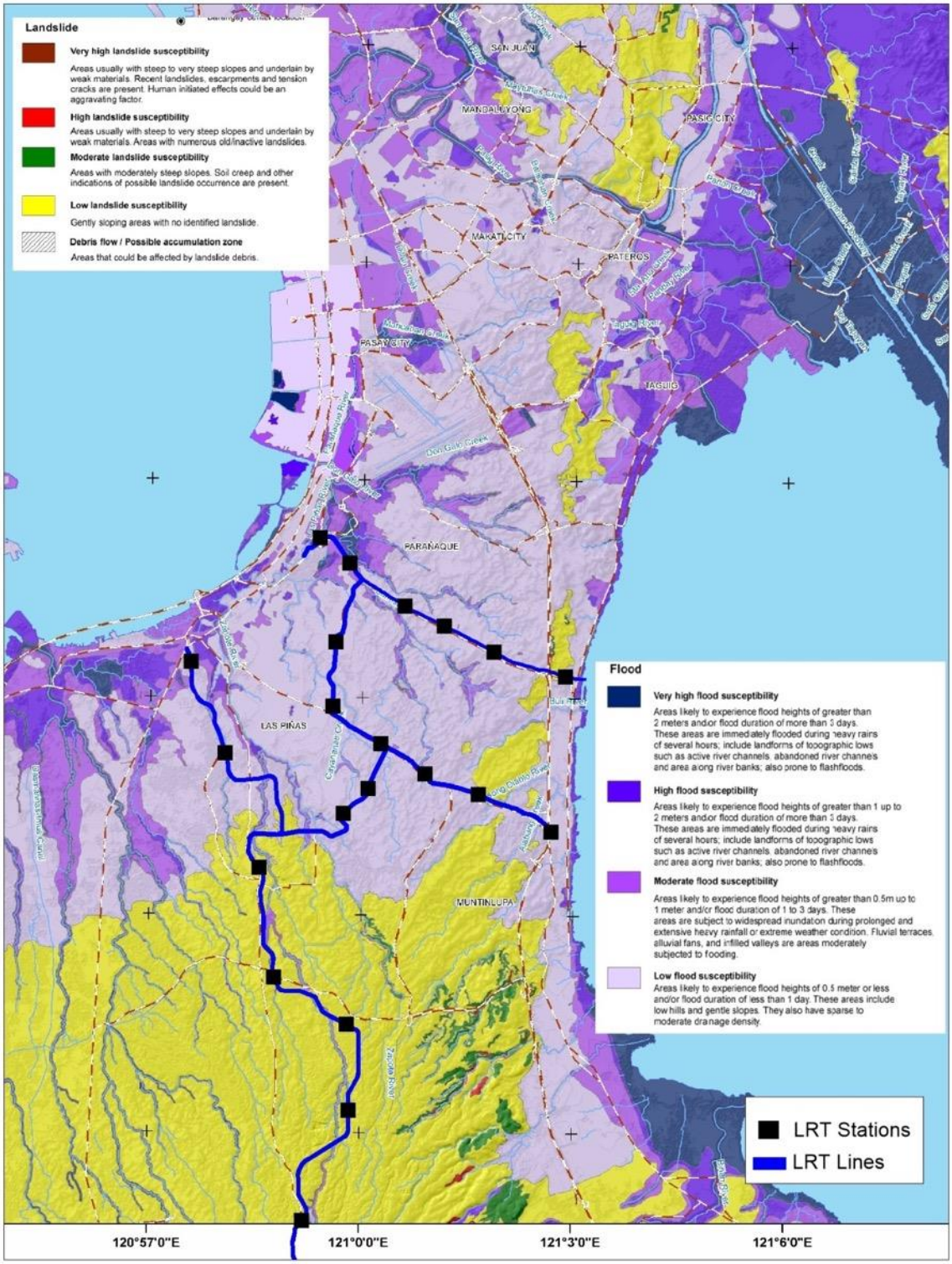


Figure 3-17. Composite flood and landslide map of Metro Manila and northern Cavite (Modified from MGB 2016).

3.1.2.4.4 Summary of Geological Hazard Assessment

Geological hazard assessment indicated that the sites for the proposed LRT lines are prone to a number of geohazards, the most important of which is ground acceleration caused by earthquakes.

The following matrix presents the major and minor geohazards in the project site as well as the recommended mitigating measures to address these hazards.

Table 3-12. Summary matrix of geological hazards prevalent in the project site and vicinity.

Geohazards	Mitigating Measures
Ground Acceleration	• The final structural design must consider the computed deterministic peak ground acceleration for the soil and rock conditions at the sites in worst-case earthquake scenarios • Monitor changes in the sub-surface rock/soil conditions and identify geologic structures that may exist on the sites
Liquefaction	• Mitigation may include compaction or grouting as the foundations/footings/columns must be built on competent layer • Other engineering measures to prevent loss of bearing capacity that may also induce settlement
Differential Settlement	• Footings and foundations must be laid on the competent materials • Engineering measures like compaction and grouting to minimize loss of strength of the soil
Subsidence	• Removal of loose sediments and laying of foundation on competent layer
Flooding	• Minor hazard; Embankments should be constructed around the footings to prevent inundation

3.1.2.5 Key Project Impacts to Geology/Geomorphology

3.1.2.5.1 Change in surface landform/topography/terrain/slope

Change in surface landform, topography and slope is not expected as a result of project development. Pre-construction activities are not expected to cause significant terrain alteration as this will only involve surveys, geotechnical studies and detailed engineering design.

The LRT alignments will be built on flat to undulating topography of Metro Manila and northern Cavite. The southern portion of the project site is underlain by Taal Pyroclastics and the northern portion by tuff/tuffaceous and pyroclastic deposits belonging to the Guadalupe Formation. Quaternary Alluvium underlies both ends of Line 6C and the eastern side of the Alabang-Zapote LRT Line.

The unconsolidated alluvial sediments will be removed or will be subjected to soil compaction during site preparation. Removal of overlying burden may have an effect on the groundwater condition in the area as the aquifer and aquitard water systems are disrupted. However, it is deemed that the effect will be temporary and small in magnitude especially near the coastal and tidal area where unloading of sediments and ebb-flow phenomenon take place regularly.

Major terrain modifications will occur in the area between Alabang and Zapote Stations where the LRT Line-6A alignment will be on embankment. Construction of the embankment will change the existing topographic condition but this is expected to be insignificant considering that this will be a short segment of the entire LRT Line-6A alignment.

The topography in general will not change as the elevation of the ground will not be largely affected by the columns. For the sites of the embankment and the stations, the ground is expected to be leveled with the surroundings to minimize unsightly appearance or settlement engineering hazard.

The geotechnical study that will be undertaken during the pre-construction phase is expected to identify the potentially unstable slopes, if any, and recommend measures for slope protection and soil improvement to minimize or prevent slope failure during the construction phase.

3.1.2.5.2 Change in subsurface/underground geomorphology

Excavation for foundation of elevated structures can lead to change in subsurface/underground geomorphology through the removal of overburden materials and weathered rocks to facilitate the placement of required

engineering structures for the elevated sections. However, the extent can only be determined during the detailed engineering design phase. Excavations and removal of overlying material and substrate will be limited along the LRT project. It is also expected that the foundations and columns will be laid few meters from the ground surface.

3.1.2.5.3 Inducement of subsidence, liquefaction, landslides, mud/debris flow

Subsidence

The weight load that the LRT structure will put on the ground will likely cause subsidence in areas underlain by loose sediments. As the construction and laying out of foundation commence, the substrate will undergo compaction under the weight. However, subsidence is considered just a few millimeters to centimeters.

Liquefaction

The initial phase of the operation will include the preparation of the ground site. The unconsolidated sediments can be compacted or removed as the LRT structures must be built on the competent soil layer. The compaction or removal of the loose deposits will improve the strength and the condition of the substrate, thus the likelihood of liquefaction to occur is decreased.

Landslides

The topography along the length of the LRT lines and the surrounding areas is characterized as flat to gently sloping. Therefore, the LRT project will not induce landslides in the surrounding areas.

Mud/debris flow

The southern segment of LRT Line-6A is situated in Dasmariñas with undulating terrain. Excavation of soil materials will produce stockpiles which under the influence of gravity move downslope along sloping sections. Mud/debris flow shall be apparent during the construction phase of the project and shall be non-existent during the operation phase.

The final design of the elevated structure should comply with the requirements of the National Building Code and Structural Code of the Philippines based on the results of the geotechnical and seismicity studies to minimize the impacts of liquefaction, ground shaking and other seismic hazards.

3.1.3 Soils

The soils present in the project sites belong to the Guadalupe series which are derived from the weathering of the Guadalupe tuff, locally known as adobe. These soils are generally found on rolling to gently rolling areas and in some flat areas. The Guadalupe series consists of various soil types, namely sand, silt loam, loam, clay loam, silty clay, and clay adobe phase. Clays are characterized as coarse and granular when dry but sticky and plastic when wet. This soil type is suited for the cultivation of lowland rice and corn and for orchard and pasture when located in the uplands. Guadalupe Clay Adobes are hard and compact and difficult to cultivate, making it generally unsuitable for diverse cropping.

The Guadalupe Clay and Guadalupe Clay Adobe are generally found in the lowland areas of Cavite, particularly in the southern part of Bacoor near the boundary with Dasmariñas and in the southern part of Las Piñas City, most barangays of Muntinlupa, and most areas of Parañaque City.

Sandy loam, silty clay, and sandy clay loam are found in areas adjacent to the Laguna Lake on the east and Manila Bay on the west. These soils are derived from recent alluvial, lacustrine or coastal deposits and highly suitable for agricultural production but experience seasonal flooding.

Soil sampling for soil fertility analysis was not conducted for this study since the proposed alignments are located on highly built-up areas with commercial, institutional and residential land uses. Geotechnical analysis to determine the soil/foundation properties will be undertaken as part of the detailed engineering study.

The soil erosion map of the project site and vicinity is shown in **Figure 3-18**. As shown on the map, the northern segment of LRT Line-6A has slight susceptibility to erosion while the middle and southern segments are prone to moderate erosion. The erosion susceptibility of areas where the other LRT Line 6 alignments are located is unclassified, possibly because of the highly built up nature of these areas.

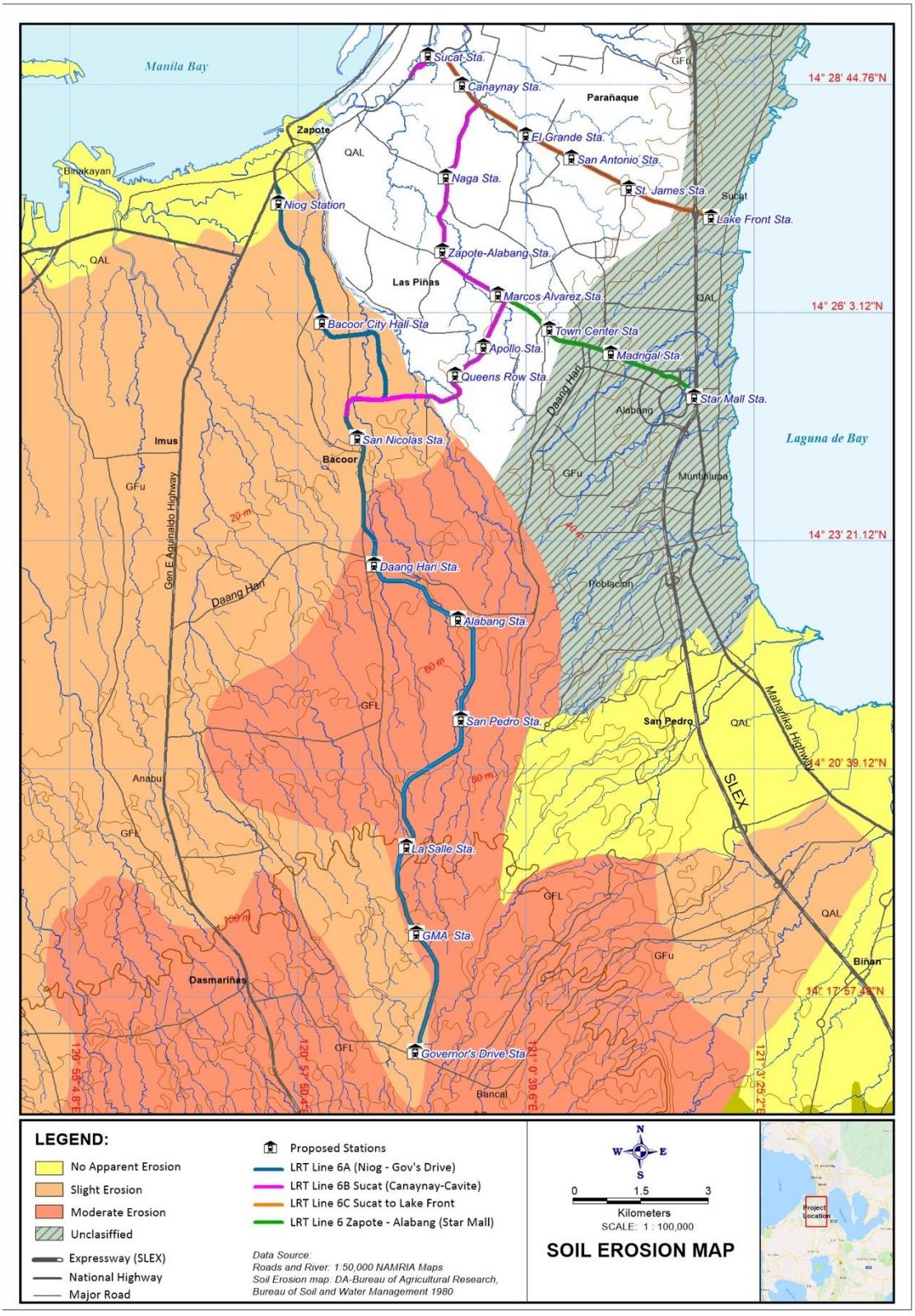


Figure 3-18. Soil erosion map of the project site and vicinity.

3.1.4 Terrestrial Ecology

3.1.4.1 Terrestrial Flora

The vegetation study component aims to achieve the following objectives:

1. To characterize the present condition of the study site in terms of its vegetation communities and their component plant species;
2. To predict the likely impacts to the vegetation and plant species of the proposed development to the site; and
3. To recommend measures that can mitigate the negative impacts and enhance the positive impacts of the proposed project.

3.1.4.1.1 General Approach and Field data collection

Owing to the highly built-up and highly urbanized conditions of the project site, the study of the vegetation and component species along the proposed alignment and stations in the project site utilized a qualitative vegetation survey (Mueller–Dombois and Ellenberg 1971; Kent & Coker 1992) where listing of plants found along the proposed alignment and stations of the LRT 6 was made and their conservation determined.

At each proposed alignment (i.e. LRT Line-6A, LRT Line-6B, LRT Line-6C, and Alabang Zapote LRT Line), plants found in each of the proposed train stations were listed and identified. Opportunistic recording/listing of plants encountered on the way from one station to another was also undertaken to supplement the data and to record/list every species encountered in the area. The summary and relative locations of the survey points are presented in **Table 3-13** and **Figure 3-19**. The geographic coordinates of these specific points are given in **Appendix 13 Table C**.

Table 3-13. Summary of sampling stations established at the study site.

Survey Route	Alignment	No. of observation points
1	Sucat to Lake Front	6
2	Canaynay (Sucat) to Cavite	5
3	Zapote to Alabang/Star Mall	3
4	Niog to Governor's Drive	16

At each station, identification of plants was made onsite. Sample specimen was collected, properly labeled and brought to a laboratory in forestry campus, Los Baños, Laguna to verify the species identification in the field.

Available botanical references for Philippine plants such as that of Primavera et al. (2016), Palis (2013), Madulid (2000), Rojo (1999), De Guzman et al. (1986) and Moody (1984) were used to confirm the field identification. Online sources and other references such as the various digital/electronic library of plants on the internet (e.g. Co's Digital Flora of the Philippines) and Guide to Philippine Flora and Fauna series were also utilized.

The collected data were summarized in a table with corresponding scientific, common and family names for the whole study site, in addition to the summary table of species per sampling station. Moreover, the conservation status of each recorded species was determined based on the Updated National Red List of Threatened Philippine Plants (DENR DAO 2017-11) and IUCN Red List.

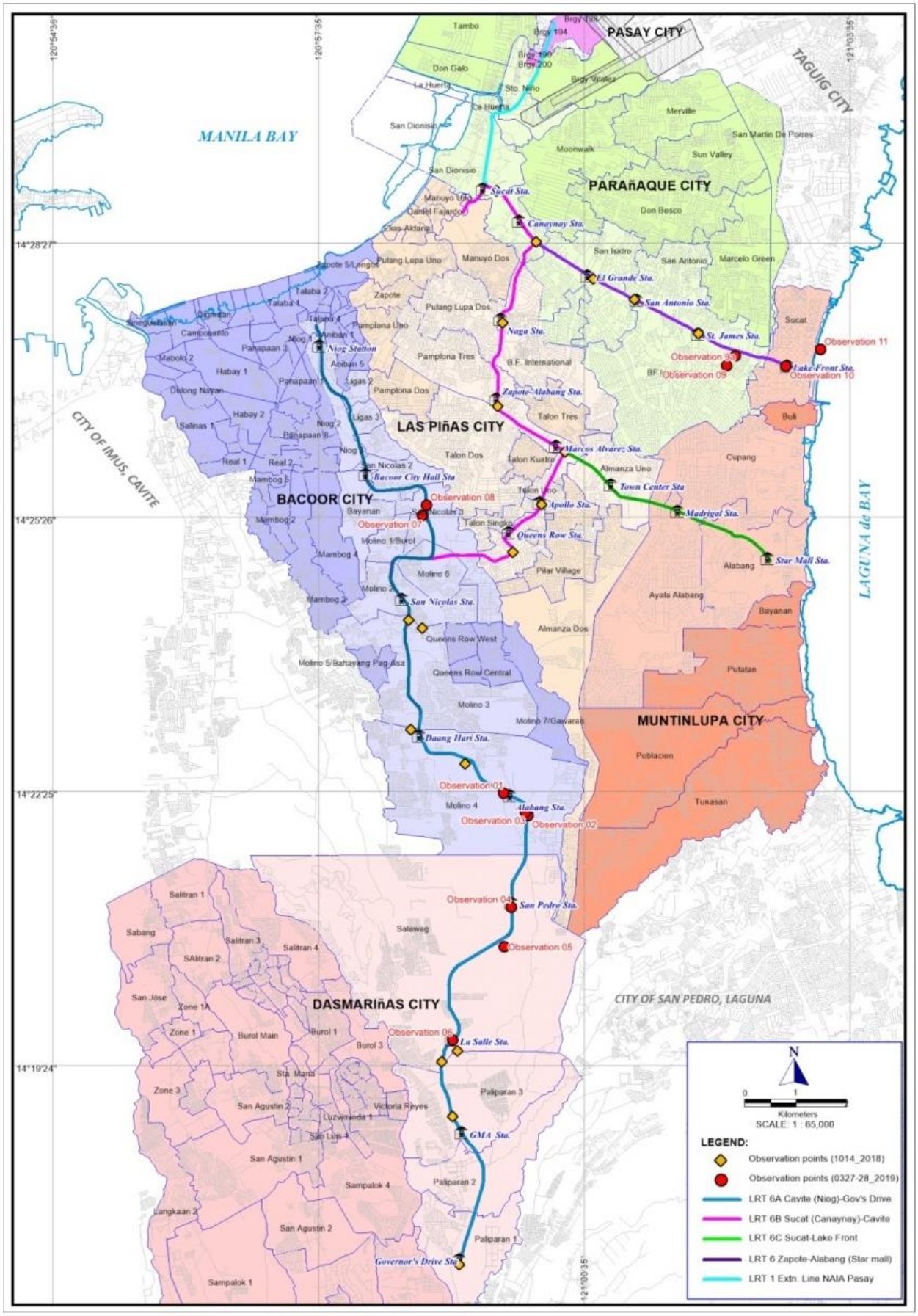


Figure 3-19. Relative location of sampling points for vegetation survey along the LRT 6 alignment.

3.1.4.1.2 General Description of Vegetation Cover

Almost all of the alignments are located along national roads and pass through highly commercialized and heavily built-up areas. The plants encountered are expectedly those being used in roadside plantings and road island landscaping composed of domesticated, ornamental, garden and flowering plants. This is especially true along Dr. A. Santos Avenue (formerly known as Sucat Road) to Lakeshore area, along Alabang-Zapote Road through to Madrigal Business Park, and the alignment going to the Las Piñas area through Daanghari.

Furthermore, the plant community encountered at the southern portion of the LRT 6 project from Molino Boulevard to Governor's Drive are wild plants commonly occurring in open and abandoned areas composed of sun-loving trees, agricultural weeds, and grasses. This portion is less commercialized but heavily occupied also by residential houses.

Diversity and Composition

A total of 80 plant species belonging to 73 genera in 35 families were recorded (**Appendix 13 Table A**). Of the total species, 42 are trees, while the rest is composed of shrubs (9), herbaceous (14), weed grasses (6), vine (3), palms (4) and bamboo (2) as shown in **Figure 3-20**.

Of the total number of plant families recorded, Family Fabaceae is most represented with 12 species, followed by Poaceae (Grass family) with eight species and Moraceae (Fig family) with seven species. The majority (77%) of the families are represented by one to two species each. On the other hand, of the total number of genera recorded in the LRT 6 project, the genus *Ficus* is represented the most with five species, followed by *Acacia* with three species. The rest (97%) of the species are represented by one to two species each.

The list of all plants recorded in the study site is shown in **Appendix 13 Table A**.

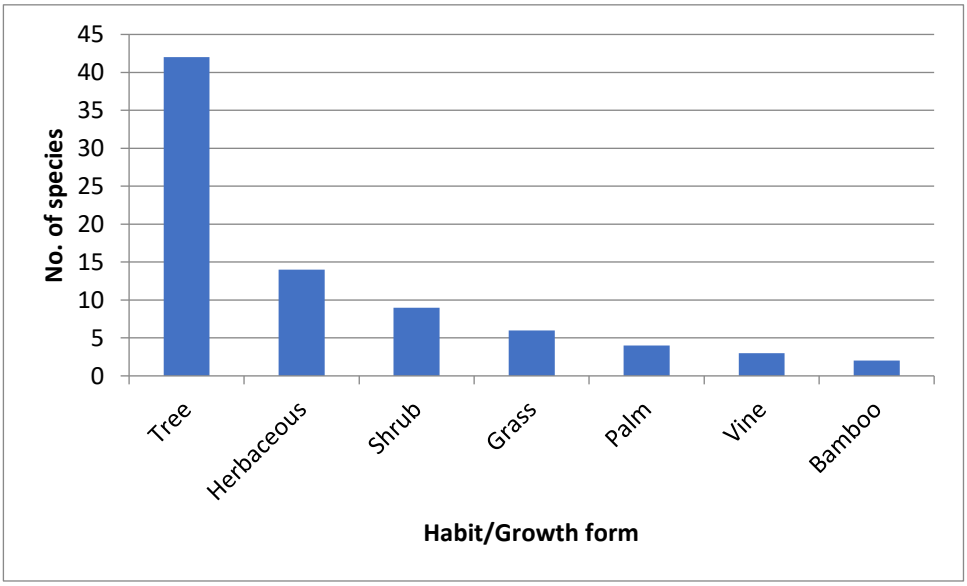


Figure 3-20. Number of species recorded in LRT 6 study site based on habit/growth form

LRT Line-6A (Niog – Governor's Drive)

A total of 53 species under 27 families were recorded along the LRT Line-6A alignment. Of this number, 24 are tree species, with five species of shrubs and 13 species of herbaceous plants. In addition, two species each of vine and bamboo were recorded. The trees were represented by fruit trees like Sampalok and Mango, timber species like Narra and Mahogany, species for landscaping such as Talisay, Rain tree and Fire Tree, and pioneer trees that are common in open areas like Anabiong, Binunga, Datiles, and Alim, as shown in **Table 3-14** below.

Table 3-14. Plants recorded along LRT Line-6A.

Species	Common Name	Family	Habit
Acacia farnesiana	Aroma	Fabaceae	Tree
Achyranthes aspera	Hangod	Acanthaceae	Herb
Amaranthus sp.	Uray	Amaranthaceae	Herb
Araceae sp.	Araceae sp	Araceae	Herb
Bambusa spinosa	Kawayan tinik	Poaceae	Bamboo
Bauhinia sp.	Bauhinia vine	Facaceae	Vine
Carica papaya	Papaya	Caricaceae	Tree-like
Ceiba pentandra	Kapok	Bombacaceae	Tree
Chromolaena odorata	Hagonoy	Asteracaceae	Herb
Colocasia esculenta	Gabi	Araceae	Herb
Crescentia cujete L.	Calabash Tree	Bignoniaceae	Tree
Crinum asiaticum L.	Bakong Amazon lily	Amaryllidaceae	Herb
Delonix regia (Boj. Ex Hook.) Raf.	Fire Tree	Fabaceae	Tree
Eleusine indica	Paragis	Poaceae	Grass
Ficus elastica	Ficus	Moraceae	Tree
Ficus nota (Blanco) Merr.	Tibig	Moraceae	Tree
Ficus religiosa	Ficus	Moraceae	Shrub
Ficus sp.	Balete	Moraceae	Tree
Gigantochloa levis	Bolo	Poaceae	Bamboo
Gliricidia sepium (Jacq.) Walp.	Kakauate	Fabaceae	Tree
Hyptis suaveolens	Suag kabayo	Lamiaceae	Herb
Imperata cylindrica	Cogon	Poaceae	Grass
Ipomoea aquatica	Kangkong	Convolvulaceae	Herb
Jatropha curcas	Tubang bakod	Euphorbiaceae	Shrub
Leucaena leucocephala	Ipil-ipil	Fabaceae	Tree
Macaranga tanarius	Binunga	Euphorbiaceae	Tree
Mangifera indica	Mangga	Anacardiaceae	Tree
Manihot esculenta	Cassava	Euphorbiaceae	Shrub
Melanolepis multiglandulosa	Alim	Euphorbiaceae	Tree
Mikania cordata	Uoko	Asteraceae	Vine
Mimosa pudica	Makahiya	Mimosaceae	Herb
Moghania strobilifera	Payang payang	Fabaceae	Herb
Muntingia calabura L	Datiles	Malvaceae	Tree
Musa sapientum	Banana	Musaceae	Tree-like
Nerium oleander	Nerium	Apocynaceae	Shrub
Phragmites sp.	Reed	Poaceae	Grass
Pinus insularis	Pine tree	Pinaceae	Tree
Pithecellobium dulce	Kamachile	Fabaceae	Tree
Pterocapus indicus	Narra	Fabaceae	Tree
Ricinus communis	Castor oil plant	Euphorbiaceae	Shrub
Saccharum sp.	Sugar cane	Poaceae	Grass
Saccharum spontaneum	Talahib	Poaceae	Grass
Samanea saman	Rain tree	Fabaceae	Tree
Schefflera odorata	Galamay-amo	Araliaceae	Herb
Sida rhombifolia	Takling baka	Malvaceae	Herb
Sterculia foetida	Kalumpang	Sterculiaceae	Tree
Streblus asper	Kalios	Moraceae	Tree
Swietenia macrophylla	Mahogany	Meliaceae	Tree
Tamarindus indica	Sampalok	Fabaceae	Tree
Terminalia catappa L.	Talisai	Combretaceae	Tree
Trema orientalis (L.) Blume	Anabiong	Celtidaceae	Tree
Urena lobata	Mangkit	Malvaceae	Herb
Zyziphus sp.	Zyziphus	Rhamnaceae	Tree

LRT Line-6B (Canaynay – Bacoor)

For LRT Line-6B, a total of 24 species under 14 families were recorded. Of the total number of species, 20 are trees, two are shrubs, with one species each of vine and grass. As shown in **Table 3-15**, four species of fruit trees were recorded, including Mango, Chico, Coconut and Sampalok. Timber and shade species were also recorded, to include the threatened Narra and Molave, and exotic trees such as Rain tree, Fire tree, and Mahogany.

Table 3-15. Plants recorded along LRT Line-6B.

Species	Common Name	Family	Habit
Acacia auriculiformis	Auri	Fabaceae	Tree
Bougainvillea spectabilis Willd.	Bougainvilla	Nyctaginaceae	Vine
Broussonetia luzonica	Himbabao	Moraceae	Tree
Cassia spectabilis	Antsoan dilaw	Fabaceae	Tree
Cocos nucifera	Coconut	Arecaceae	Tree
Delonix regia	Fire tree	Fabaceae	Tree
Eleusine indica	Paragis	Poaceae	Grass
Eugenia sp.	Eugenia	Myrtaceae	Shrub
Ficus elastica	Ficus	Moraceae	Tree
Ficus nota (Blanco) Merr.	Tibig	Moraceae	Tree
Ficus religiosa	Ficus	Moraceae	Shrub
Leucaena leucocephala	Ipil-ipil	Fabaceae	Tree
Macaranga tanarius	Binunga	Euphorbiaceae	Tree
Mangifera indica	Mangga	Anacardiaceae	Tree
Manilkara sapota	Chico	Sapotaceae	Tree
Moringa oleifera	Malunggai	Moringaceae	Tree-like
Muntingia calabura L	Datiles	Malvaceae	Tree
Polyalthia longifolia	Indian lanutan	Annonaceae	Tree
Pterocapus indicus	Narra	Fabaceae	Tree
Samanea saman	Rain tree	Fabaceae	Tree
Swietenia macrophylla	Mahogany	Meliaceae	Tree
Tamarindus indica	Sampalok	Fabaceae	Tree
Terminalia catappa L.	Talisai	Combretaceae	Tree
Vitex parviflora	Molave	Verbenaceae	Tree

LRT Line-6C (Sucat – Lake Front)

A total of 25 species under 15 families were recorded in the Sucat-Lake Front line (LRT Line-6C). Of this number, 10 species are trees, including individuals of fruit trees such as Mango, Kamagong/Mabolo and Santol. Timber species such as Narra, Mahogany, and Gmelina. Shade trees such as Rain tree and the medicinal Banaba were also observed. Four species of shrubs were also recorded, including three herbaceous species and two species of vine. Two species of palms and three grass species were also recorded as shown in **Table 3-16**.

Table 3-16. Plants recorded along LRT Line-6C.

Species	Common Name	Family	Habit
Acacia auriculiformis	Auri	Fabaceae	Tree
Amaranthus sp.	Uray	Amaranthaceae	Herb
Archantuophoenix alexandreia	Queensland palm	Arecaceae	Palm
Areca cathechu l.	Bunga	Arecaceae	Palm
Bougainvillea spectabilis willd.	Bougainvillea	Nyctaginaceae	Vine
Chromolaena odorata	Hagonoy	Asteracaceae	Herb
Codiaeum variegatum cv.	San francisco	Euphorbiaceae	Shrub
Crinum asiaticum l.	Bakong amazon lily	Amaryllidaceae	Herb
Diospyros discolor	Kamagong	Ebenaceae	Tree
Eucalyptus deglupta	Eucalyptus	Verbenaceae	Tree
Ficus religiosa	Ficus	Moraceae	Shrub

Species	Common Name	Family	Habit
Gmelina arborea	Gmelina	Verbenaceae	Tree
Imperata cylindrica	Cogon	Poaceae	Grass
Lagerstroemia speciosa (l.) Pers.	Banaba	Lythraceae	Tree
Lantana camara	Lantana	Verbenaceae	Shrub
Leucaena leucocephala	Ipil-ipil	Fabaceae	Tree
Mangifera indica	Mangga	Anacardiaceae	Tree
Mikania cordata	Uoko	Asteraceae	Vine
Paspalum conjugatum	Carabao grass	Poaceae	Grass
Pterocapus indicus	Narra	Fabaceae	Tree
Ricinus communis	Castor oil plant	Euphorbiaceae	Shrub
Saccharum spontaneum	Talahib	Poaceae	Grass
Samanea saman	Rain tree	Fabaceae	Tree
Sandoricum koetjape	Santol	Meliaceae	Tree
Swietenia macrophylla	Mahogany	Meliaceae	Tree

Alabang-Zapote LRT Line

Along the Alabang-Zapote LRT Line, which passes through the Madrigal Business Park along Alabang-Zapote Road, a total of 13 species under nine families were recorded as shown in **Table 3-17**. Of this number, 11 tree species were recorded, with one species each of palm, herbaceous and vine. The trees are composed of fruit trees such as Mango, Coconut and Sampalok, as well as timber species like the threatened Narra and the exotic Mahogany. Date palm and ornamental plants such as Kalachuchi and Bougainvillea were also recorded.

Table 3-17. Plants recorded along the Alabang-Zapote LRT Line.

Species	Common Name	Family	Habit
Azadirachta indica A. Juss.	Neem	Meliaceae	Tree
Bougainvillea spectabilis Willd.	Bougainvilla	Nyctaginaceae	Vine
Cocos nucifera	Coconut	Arecaceae	Tree
Crinum asiaticum L.	Bakong Amazon lily	Amaryllidaceae	Herb
Mangifera indica	Mangga	Anacardiaceae	Tree
Muntingia calabura L	Datiles	Malvaceae	Tree
Phoenix dactylifera L.	Date palm	Arecaceae	Palm
Plumeria sp.	Kalachuchi	Apocynaceae	Tree
Pterocapus indicus	Narra	Fabaceae	Tree
Samanea saman	Rain tree	Fabaceae	Tree
Swietenia macrophylla	Mahogany	Meliaceae	Tree
Tamarindus indica	Sampalok	Fabaceae	Tree
Terminalia catappa	Talisay	Combretaceae	Tree

Conservation Status

Of the total number of plant species recorded in the LRT 6 study site, a total of three tree species were listed as having a conservation status of Endangered and Vulnerable, according to the updated list of threatened plants in the Philippines (DAO 2017-11; **Table 3-18**). These threatened plants, however, are common trees along roadsides and landscaped areas.

Table 3-18. List of threatened species recorded in the study site per DAO 2017-11.

Species	Common Name	Habit	Conservation Status	Train Station where Recorded
Vitex parviflora	Molave	Tree	Endangered	1
Diospyros discolor	Kamagong	Tree	Vulnerable	2, 3
Pterocarpus indicus	Narra	Tree	Vulnerable	1, 4, 5, 6

1 = Alabang-Zapote 2 = Canaynay 3 = SM Sucat, 4 = Governor's Drive
5 = La Salle 6 = St. James

DENR DAO 2017-11 defines the different conservation categories for threatened species as follows: "Endangered Species refers to a species, subspecies, varieties or forma that is not critically endangered but whose survival in the wild is unlikely if the causal factors continue operating. Vulnerable Species refers to a species or subspecies, varieties, formae or other infraspecific categories of plants that are not critically endangered or endangered but is under threat from adverse factors throughout its range and is likely to move to the endangered category in the future."

Endemic Species

Of a total number of species recorded, only two are Philippine endemics as shown in **Table 3-19**. The two endemic species recorded are common plants in open area (Himbabao) and in landscaped sites (Kamagong).

Table 3-19. Endemic species found in the LRT 6 study site.

Species	Common Name	Family	Habit
Broussonetia luzonica	Himbabao	Moraceae	Tree
Diospyros discolor	Kamagong	Ebenaceae	Tree

3.1.4.1.3 Key Project Impacts to Terrestrial Flora

Construction Phase

Vegetation removal and potential loss of habitat

Site clearing, creation of access road and other earthworks prior to and during the construction of the project will entail vegetation removal along the project alignment. Removal of vegetation would also mean loss of habitat for the vertebrates and invertebrate animals. However, vegetation clearing will only occur along the proposed railway alignment.

Threat to existence, abundance, frequency, and distribution of important local species

The vegetation removal to make way for the project construction may also negatively impact the threatened and endemic plants in the proposed project site. However, these species can be propagated in the nursery and be planted later on in the area.

Exposure to greater potential climate risk and vulnerability

Vegetation removal may contribute to exposing the project to greater potential climate risk and vulnerability, especially during extreme weather events such as extreme rainfall, elevated temperatures and drought associated with climate change. Vegetation sequesters and stores carbon from the atmosphere and provides cover and protects the soil against the erosive force of raindrops. However, the area is insignificantly covered with vegetation and vegetation removal will only be done at a minimum and only when necessary.

Operation Phase

Revegetation

Revegetation of selected spots of the project is a positive impact and will improve not only the aesthetic value of the site but also enhance its ecology, including the expected increase in the organic matter content of the soil from litterfall and root turn over and biomass, both above-ground and below-ground. Re-vegetation would eventually provide microhabitats for pollinators such as insects, birds, and small faunal species.

Threat of Alien Invasive Species to Existing Biodiversity

The landscaping of the project facilities should contribute to improving the aesthetic value of the project site. It would be possible that a number of introduced ornamental garden plants (trees, shrubs, herb, and vine) will be used. Exotic species that have the tendency to become invasive could escape the project site if not regulated and may negatively impact the local biodiversity in the area.

3.1.4.2 Terrestrial Fauna

3.1.4.2.1 Methodology

The three methods used for information gathering on terrestrial fauna were: 1) secondary source survey; 2) interviews of key informants who have resided at least a year in the proposed project area; and 3) direct observation.

The secondary sources for wild fauna species were mainly internet-available reports of avifaunal presence in the general project area.

Key Informants were interviewed on-site using a questionnaire patterned after Pilcher and Kwan's (2011) rapid assessment method where colored identification printouts of avifauna, herpetofauna, and mammals were shown. Key informants were non-randomly selected based on their residency in the area for at least 1 year by the interview dates on 27-28 March 2019. Thus, the data on terrestrial fauna acquired by this method only cover up to 28 March 2019.

Direct observations for diurnal avifaunal and mammalian species were made during the reconnaissance survey on the proposed station areas and along road alignments on 13 October 2018 and 27-28 March 2019. Aided by binoculars and digital camera, observations were also conducted during opportunistic events (e.g. while in transit from one station to another). The locations of direct observation sites are listed in **Table 3-20** and shown in **Figure 3-21**. It can be observed that commercial areas were the dominant settings (13 direct observation sites, 57%). Residential areas were in three direct observation sites (13%) while seven (30%) direct observation sites had mostly grasses.

Table 3-20. Locations of the direct observation sites and indicative descriptions of each site.

	Name of Site	°N Latitude	°E Longitude	REMARKS
1	Jeepney terminal	14.453486	121.048796	Open area used as a jeepney terminal/adjacent to a lot with grassy area and trees
2	St. James	14.458795	121.031843	Commercial area/roadside
3	San Antonio	14.464891	121.018971	Commercial area/roadside
4	El Grande	14.469655	121.010482	Commercial area/roadside
5	Canaynay	14.475181	121.001375	Commercial area/roadside
6	Sucat	14.484744	120.993523	Commercial area/roadside
7	Naga	14.460460	120.994681	Residential area/roadside
8	Alabang-Zapote	14.444748	120.994058	Commercial area/roadside
9	Marcos-Alvarez	14.436759	121.006950	Commercial area/roadside/ Extensive diggings/ earth moving works
10	Apollo	14.427239	121.002409	Commercial area/roadside
11	Queen's Row	14.418351	120.997122	Commercial area/school zone/roadside
12	San Nicolas (alignment only)	14.417277	120.988748	Residential (high density)
13	Alignment from Bacoor City Hall Station	14.426842	120.980855	Dominantly grassy area, with low trees
14	San Nicolas	14.406061	120.977747	Commercial/roadside
15	Vista Mall Daang Hari	14.385786	120.978212	Commercial/roadside
16	Alabang (observation point 01)	14.379822	120.988224	Residential / Extensive diggings/ earth moving works
17	San Pedro (Green gate)	14.375685	120.996187	Grazing ground/grassy area
18	San Pedro (inside subdivision)	14.353911	120.997825	Grassy area/across dumpsite
19	Governor's Drive	14.287480	120.988912	Commercial/roadside
20	GMA	14.314998	120.987735	Mixed use, dominantly grassy area, with low trees, bananas&vines/roadside
21	La Salle (observation point 01)	14.325556	120.984747	Grassy area/roadside
22	La Salle (observation point 02)	14.326852	120.987385	Grassy area/roadside
23	Madrigal (On alignment)	14.426867	121.025629	Commercial/Roadside

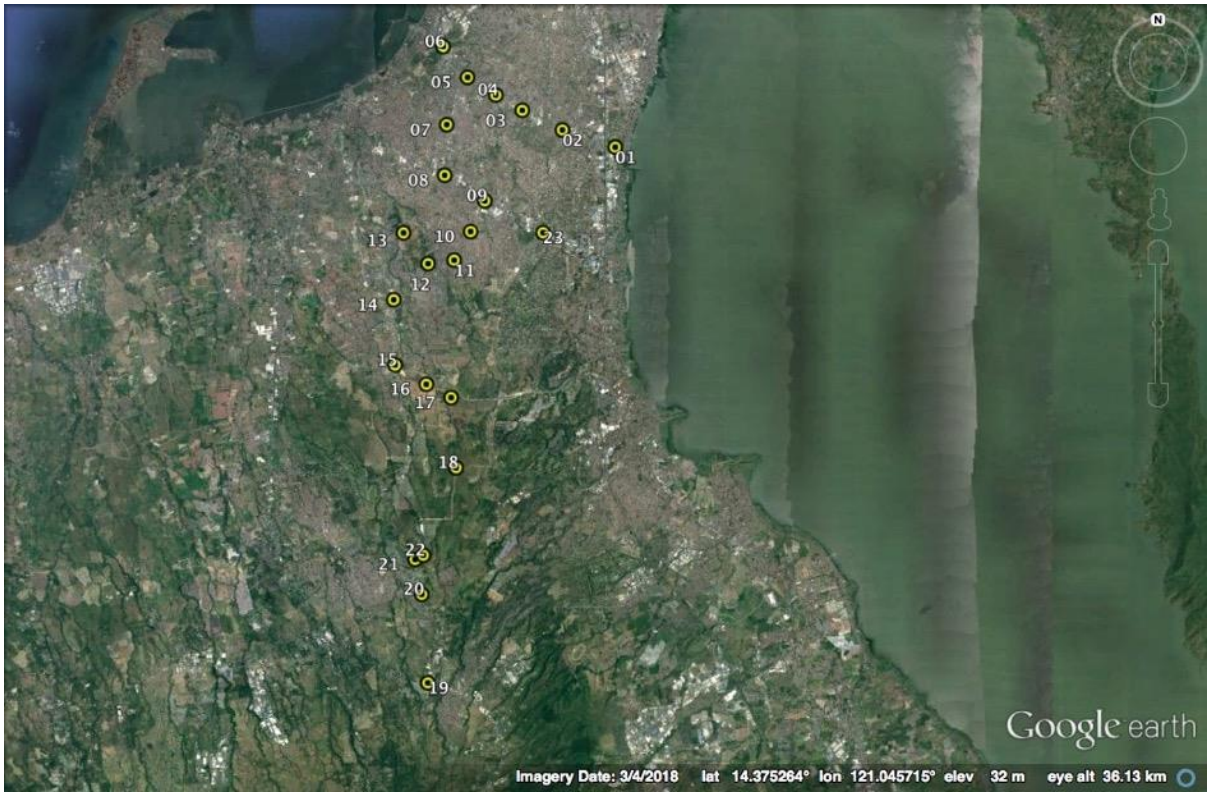


Figure 3-21. Location map of selected direct observation sites for avifauna consolidated for fieldwork on 13 October 2018 and 27-28 March 2019.

3.1.4.2.2 Species composition

The proposed project area has been historically affected by widespread human use, such as agriculture, settlement, and trade. Thus, although identified as part of the Greater Luzon Terrestrial Biogeographic Region (Ong et al. 2002), human activity has highly influenced the biodiversity component of the area.

Avifauna

A total of 87 different taxa of birds were derived from internet available sources, direct observations and key informant interviews (**Table 3-21**). To provide a comparison of reported avifaunal composition over time, **Table 3-21** includes 78 bird species reported in the general Ayala-Alabang area, as monitored since 2008 by Ramos and Ramos. Notably, the species reported are almost all classified as "Least Concern" under the IUCN Red List assessments. No photodocumentary evidence is uploaded for the only two species that have higher IUCN Red List categories, namely: (1) green racket-tail (*Prioniturus luconensis*) classified as "Endangered"; and (2) blue-naped parrot (*Tanygnathus lucionensis*) classified as "Near-threatened".

Meanwhile, 23 species were identified out of the 27 discrete taxa directly observed during this study. All 23 were classified as "Least Concern" under the IUCN Red List assessments (**Table 3-21**). Two species were detected across almost all 23 direct observation sites, namely: (1) Eurasian tree sparrow (*Passer montanus*); and (2) yellow-vented bulbul (*Pycnonotus goiavier*).

Table 3-21. Comparison of this study's results with a reported avifaunal composition around the proposed project area as monitored since 2008 (Ramos and Ramos, 2019).

	Scientific name	Common English Name	Since 2008	This study (2019)	IUCN Red List Category
	ARDEIDAE				
1	*Ixobrychus sinensis*	Yellow Bittern	✓		LC
2	*Nycticorax nycticorax*	Black-crowned Night Heron	✓		LC
3	*Butorides striata*	Striated Heron	✓		LC
4	*Ardeola bacchus*	Chinese Pond Heron	✓		LC
5	*Ardea purpurea*	Purple Heron	✓		LC
6	*Ardea alba*	Great Egret	✓		LC
7	*Ardea intermedia*	Intermediate Egret		✓	LC
8	*Egretta garzetta*	Little Egret	✓	✓	LC
9	*Bubulcus ibis*	Cattle Egret		✓	LC
10	*Egretta sp.*	(UNIDENTIFIED) Egret		✓	
	ACCIPITRIDAE				
11	*Pandion haliaetus*	Western Osprey	✓		LC
12	*Accipiter soloensis*	Chinese Sparrowhawk*	✓		LC
13	*Haliastur indus*	Brahminy Kite*	✓		LC
	PHASIANIDAE				
14	*Gallus gallus*	Chicken		✓	LC
15		(UNIDENTIFIED) Quail		✓	
	RALLIDAE				
16	*Gallirallus torquatus*	Barred Rail	✓		LC
17	*Gallirallus striatus*	Slaty-breasted Rail	✓		LC
18	*Amaurornis phoenicurus*	White-breasted Waterhen	✓		LC
	CHARADRIIDAE				
19	*Pluvialis fulva*	Pacific Golden Plover	✓		LC
20	*Chlidonias hybrida*	Whiskered Tern	✓		LC
21	*Chlidonias leucopterus*	White-winged Tern	✓		LC
	COLUMBIDAE				
22	*Columba livia*	Rock dove		✓	LC
23	*Streptopelia tranquebarica*	Red Turtle Dove	✓		LC
24	*Spilopelia chinensis*	Spotted Dove	✓		LC
25	*Geopelia striata*	Zebra Dove	✓	✓	LC
26	*Ptilinopus leclancheri*	Black-chinned Fruit Dove	✓		LC
	CUCULIDAE				
27	*Centropus viridis*	Philippine Coucal	✓		LC
28	*Centropus bengalensis*	Lesser Coucal	✓		LC
29	*Chrysococcyx xanthorhynchus*	Violet Cuckoo*	✓		LC
30	*Cuculus optatus*	Oriental Cuckoo	✓		LC
	TYTONIDAE				
31	*Tyto longimembris*	Eastern Grass Owl*	✓		LC
	STRIGIDAE				
32	*Otus megalotis*	Philippine Scops Owl*	✓		LC
33	*Bubo philippensis*	Philippine Eagle-Owl	✓		LC
	SCOLOPACIDAE				
34	*Gallinago sp.*	Snipe	✓		
	CAPRIMULGIDAE				
35	*Caprimulgus manillensis*	Philippine Nightjar*	✓		LC
36	*Caprimulgus affinis*	Savanna Nightjar	✓		LC

	Scientific name	Common English Name	Since 2008	This study (2019)	IUCN Red List Category
	APODIDAE				
37	*Collocalia marginata*	Grey-rumped Swiftlet	✓		NA
38	*Hirundapus celebensis*	Purple Needletail	✓		LC
39		(UNIDENTIFIED) Swiflet		✓	
	ALCEDINIDAE				
40	*Halcyon smyrnensis*	White-throated Kingfisher	✓		LC
41	*Todiramphus chloris*	Collared Kingfisher	✓		LC
42	*Alcedo atthis*	Common Kingfisher	✓		LC
	MEROPIDAE				
43	*Merops philippinus*	Blue-tailed Bee-eater	✓		LC
	MEGALAIMIDAE				
44	*Megalaima haemacephala*	Coppersmith Barbet	✓		LC
	PICIDAE				
45	*Dendrocopos maculatus*	Philippine Pygmy Woodpecker	✓		LC
	FALCONIDAE				
46	*Falco peregrinus*	Peregrine Falcon	✓		LC
	PSITTACIDAE				
47	*Psittacula krameri*	Rose-ringed Parakeet	✓		LC
48	*Prioniturus luconensis*	Green Racket-tail*	✓		EN
49	*Tanygnathus lucionensis*	Blue-naped Parrot*	✓		NT
50	*Loriculus philippensis*	Philippine Hanging Parrot/ Colasisi *	✓		LC
	PITTIDAE				
51	*Erythropitta erythrogaster*	Philippine Pitta	✓		LC
	HIRUNDIDAE				
52	*Hirundo javanica*	House Swallow		✓	LC
53	*Hirundo rustica*	Barn Swallow	✓		LC
54	*Hirundo tahitica*	Pacific Swallow	✓		LC
55		(UNIDENIFIED) Swallow		✓	
	CAMPEPHAGIDAE				
56	*Lalage nigra*	Pied Triller	✓		LC
	PYCNONOTIDA				
57	*Pycnonotus goiavier*	Yellow-vented Bulbul	✓	✓	LC
	ORIOLIDAE				
58	*Oriolus chinensis*	Black-naped Oriole	✓	✓	LC
	CORVIDAE				
59	*Corvus macrorhynchos*	Large-billed Crow	✓	✓	LC
	MUSCICAPIDAE				
60	*Copsychus mindanensis*	Philippine Magpie-Robin	✓		LC
61	*Muscicapa griseisticta*	Grey-streaked Flycatcher	✓		LC
62	*Cyanoptila cyanomelana*	Blue-and-white Flycatcher	✓		LC
63	*Ficedula narcissina*	Narcissus Flycatcher	✓		LC
64	*Saxicola caprata*	Pied bushchat		✓	LC
	TURDIDAE				
65	*Monticola solitarius*	Blue Rock Thrush	✓		LC
	ACANTHIZIDAE				
66	*Gerygone sulphurea*	Golden-bellied Gerygone	✓		LC
	PHYLLOSCOPIDAE				
67	*Phylloscopus borealis*	Arctic Warbler	✓		LC
68	*Phylloscopus examinandus*	Kamchatka Leaf Warbler*	✓		LC
	LOCUSTELLIDAE				

	Scientific name	Common English Name	Since 2008	This study (2019)	IUCN Red List Category
69	*Megalurus palustris*	Striated Grassbird	✓	✓	LC
70	*Megalurus timoriensis*	Tawny Grassbird	✓		LC
	CISTICOLIDAE				
71	*Cisticola exilis*	Golden-headed Cisticola	✓		LC
	RHIPIDURIDAE				
72	*Rhipidura nigritorquis*	Philippine Pied Fantail	✓	✓	LC
	MOTACILLIDAE				
73	*Motacilla tschutschensis*	Eastern Yellow Wagtail	✓		LC
74	*Motacilla cinerea*	Grey Wagtail	✓		LC
75	*Motacilla alba*	White Wagtail	✓		LC
76	*Anthus rufulus*	Paddyfield Pipit	✓	✓	LC
	ARTAMIDAE				
77	*Artamus leucorynchus*	White-breasted Woodswallow	✓	✓	LC
	LANIIDAE				
78	*Lanius cristatus*	Brown Shrike	✓	✓	LC
79	*Lanius schach*	Long-tailed Shrike	✓	✓	LC
	STURNIDAE				
80	*Aplonis panayensis*	Asian Glossy Starling	✓	✓	LC
81	*Acridotheres cristatellus*	Crested Myna	✓	✓	LC
82	*Agropsar philippensis*	Chestnut-cheeked Starling*	✓		LC
	NECTARINIIDAE				
83	*Cinnyris jugularis*	Olive-backed Sunbird	✓	✓	LC
	ZOSTEROPIDAE				
84	*Zosterops meyeni*	Lowland White-eye	✓		LC
	PASSERIDAE				
85	*Passer montanus*	Eurasian Tree Sparrow	✓	✓	LC
	ESTRILDIDAE				
86	*Lonchura punctulata*	Scaly-breasted Munia	✓	✓	LC
87	*Lonchura atricapilla*	Chestnut Munia	✓	✓	LC

Check marks (✓) indicate that the corresponding species was encountered for the particular year. (Sources: Ramos and Ramos 2019; This study). Legend: LC = least concern; NT = near threatened; EN = endangered).

Notably, among the 87 bird species listed from 2008 to 2018, 13% are endemics while 30% are migrants (**Table 3-22** and **Figure 3-22**).

Table 3-22. Endemic species reported in the proposed project area.

	FAMILY	Scientific name	Common English Name
1	COLUMBIDAE	*Ptilinopus leclancheri*	Black-chinned Fruit Dove
2	CUCULIDAE	*Centropus viridis*	Philippine Coucal
3	STRIGIDAE	*Otus megalotis*	Philippine Scops Owl*
4		*Bubo philippensis*	Philippine Eagle-Owl
5	PICIDAE	*Dendrocopos maculatus*	Philippine Pygmy Woodpecker
6	PSITTACIDAE	*Prioniturus luconensis*	Green Racket-tail*
7		*Tanygnathus lucionensis*	Blue-naped Parrot*
8		*Loriculus philippensis*	Philippine Hanging Parrot/ Colasisi *
9	MUSCICAPIDAE	*Copsychus mindanensis*	Philippine Magpie-Robin
10	RHIPIDURIDAE	*Rhipidura nigritorquis*	Philippine Pied Fantail
11	ZOSTEROPIDAE	*Zosterops meyeni*	Lowland White-eye

Sources: Ramos and Ramos 2019; This study; IUCN Red List Species Distribution Maps). Legend: * = no photographic evidence.

Another notable characteristic of the avifauna is the large proportion (30%) of migratory species (**Figure 3-22**). The seasonal avifaunal migrations present a unique challenge to the proposed project. Endemics exhibit range restriction to the Philippines or portion thereof (e.g. the Greater Luzon Biogeographic Region). Resident species occur in other countries while having established Philippine populations (Ramos and Ramos, 2019; This study; Kennedy et al. 2000; IUCN Red List data sheets).

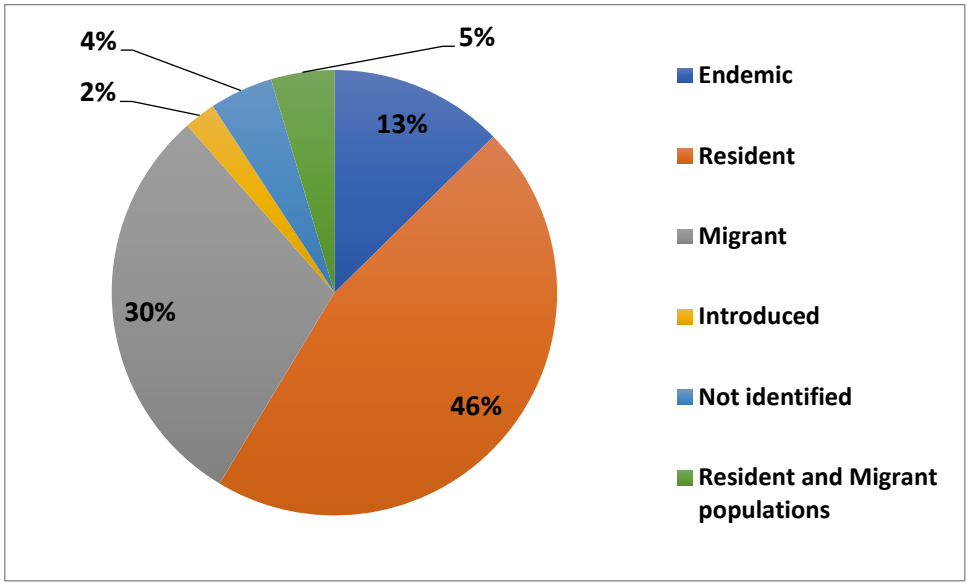


Figure 3-22. Endemicity of avifaunal species reported for the proposed project area from 2008 to 2019 according to the distributional range.

The avifaunal distribution is uneven. Two species were detected across almost all 23 direct observation sites, namely: 1) Eurasian tree sparrow (*Passer montanus*); and 2) yellow-vented bulbul (*Pycnonotus goiavier*). While the Eurasian tree sparrow (*P. montanus*) is an introduced species known to be an "urban exploiter" and the yellow-vented bulbul (*P. goiavier*) is a resident found throughout Asia and Southeast Asia, both species have been classified as "urban exploiters" by various authors (Isaksson et al 2017; Vallejo et al. 2009).

Direct Observation Site Nos. 1, 17, 18, 20, 21 and 22 which have extensive grassland/farmland habitats have higher species counts than the other Direct Observation Sites which are commercial, industrial and high-density residential (**Table 3-23**). **Plates 3-9** to **3-11** show some of the observed avifauna in the project alignments.

Plate 3-9. Paddyfield pipits (*Anthus rufulus*) in Direct Observation Site No. 16.

Table 3-23. Comparison of the avifaunal species observed in each of the Direct Observation Sites Nos. 1 to 23.

	Scientific name	Common English Name	DIRECT OBSERVATION SITE CODE																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	ARDEIDAE																								
1	Ardea intermedia	Intermediate Egret																		✔					
2	Egretta garzetta	Little Egret																✔							
3	Bubulcus ibis	Cattle Egret																✔		✔					
4	Egretta sp.	(UNIDENTIFIED) Egret																						✔	
	PHASIANIDAE																								
5	Gallus gallus	Chicken							✔					✔				✔							
6		(UNIDENTIFIED) Quail																✔						✔	
	COLUMBIDAE																								
7	Columba livia	Rock dove	✔									✔		✔				✔		✔					✔
8	Geopelia striata	Zebra Dove			✔	✔														✔			✔		✔
	APODIDAE																								
9		(UNIDENTIFIED) Swiflet						✔																	
	HIRUNDIDAE																								
10	Hirundo javanica	House Swallow					✔																		
		(UNIDENIFIED) Swallow										✔									✔			✔	
	PYCNONOTIDAE																								
11	Pycnonotus goiavier	Yellow-vented Bulbul	✔	✔			✔		✔		✔		✔	✔	✔		✔		✔	✔		✔	✔	✔	
	ORIOLIDAE																								

	Scientific name	Common English Name	DIRECT OBSERVATION SITE CODE																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
12	Oriolus chinensis	Black-naped Oriole																							✔
	CORVIDAE																								
13	Corvus macrorhynchos	Large-billed Crow																							✔
	MUSCICAPIDAE																								
14	Saxicola caprata	Pied bushchat																✔							
	LOCUSTELLIDAE																								
15	Megalurus palustris	Striated Grassbird	✔														✔		✔					✔	
	RHIPIDURIDAE																								
16	Rhipidura nigritorquis	Philippine Pied Fantail												✔											
	MOTACILLIDAE																								
17	Anthus rufulus	Paddyfield Pipit															✔	✔							
	ARTAMIDAE																								
18	Artamus leucorynchus	White-breasted Woodswallow														✔									
	LANIIDAE																								
19	Lanius cristatus	Brown Shrike	✔						✔			✔						✔					✔	✔	✔
20	Lanius schach	Long-tailed Shrike															✔	✔							
	STURNIDAE																								
21	Aplonis panayensis	Asian Glossy Starling		✔		✔														✔					

	Scientific name	Common English Name	DIRECT OBSERVATION SITE CODE																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
22	Acridotheres cristatellus	Crested Myna																✔		✔				✔	
	NECTARINIIDAE																								
23	Cinnyris jugularis	Olive-backed Sunbird																		✔					
	PASSERIDAE																								
24	Passer montanus	Eurasian Tree Sparrow	✔		✔	✔		✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔
	ESTRILDIDAE																								
25	Lonchura punctulata	Scaly-breasted Munia	✔															✔							
26	Lonchura atricapilla	Chestnut Munia	✔															✔							

Plate 3-10. *Tremna orientalis* tree shades long-tailed shrike (*Lanius schach*) and yellow-vented bulbul (*Pycnonotus goiavier*) in Direct Observation Site No. 16.

Plate 3-11. A pair of black-naped orioles (*Oriolus chinensis*) photographed on trees and palms along the roadside of Direct Observation Site No. 23.

Herpetofauna

Herpetofaunal studies in Cavite have been undertaken by Causaren et al. (2016) for amphibian diversity and Lagat (2009, 2012) for lizards. However, the researchers focused on forest patches at least 15 kilometers south of the proposed project area. Endemism was high at 70% for amphibians (Causaren et al. 2016) and 58% for lizards (Lagat 2012). Such diversity was concentrated in riverine and forest habitat. Thus, the lack of favorable riverine and forest habitat may indicate low herpetofaunal diversity in the proposed project area.

On the other hand, key informants in this study could recall only the cane toad (*Rhinella marina*) when asked about which amphibians had been encountered in the proposed project area. On reptiles, the key informants recalled house lizards, gecko, monitor lizard and "sawa" (i.e. *Python reticularis*). Notably, some key informants pointed out that a high number of cane toads and snakes would be found inside a buried pipeline traversing the road in Direct Observation Site No. 16 (Alabang Station area) and the river adjacent to the dumpsite. Key informants mentioned about road kills of pythons crossing the concrete road during early morning and early evening.

Table 3-24. List of herpetofaunal species mentioned by key informants as present in the proposed project sites with the classification of assessed threat categories using the IUCN Red List and DAO 2004-15[7].

Scientific name	Common English name	Local name	Range	IUCN Red List Status	DAO 2004-15
Anura (Frogs)					
Rhinella marina	Cane Toad		Introduced	Least Concern	Not listed
Squamata (Lizards)					
Varanus olivaceus	Monitor Lizard	bayawak	Southeastern Luzon	Vulnerable	Vulnerable
Gekko gecko	Gekko	Tuko	Indo-Malayan region from northeast India and Bangladesh to southern China and throughout Southeast Asia (including the Philippines)	Least Concern	Not listed
Squamata (Snakes)					
Python reticulatus	Reticulated phyton	Sawa	India to Island SEA	Not yet assessed	Other threatened species

Mammalian fauna

Except for the report of one "musang" treated for wounds and released around July 2018, all the other five species of large land mammals encountered in the proposed project area were human-associated as listed in **Table 3-25** as shown on **Plates 3-12** and **3-13**.

Table 3-25. Classification of threat categories of large mammal species reported or encountered in the proposed project area[8].

Scientific name	Common English name	IUCN Red List Status	DAO 2004-15
Paradoxurus hermaphroditus	Common palm civet	Least Concern	Not listed
Bos taurus	Cow	Not assessed	Not listed
Capra aegagrus hircus	Goat	Not applicable	Not listed
Bubalus bubalis	Carabao	Not assessed	Not listed
Canis familiaris	Dog	Not assessed	Not listed
Felis catus	Cat	Not assessed	Not listed
	Rat		

[7] Sources: This study; IUCN Red List Assessments; DAO 2004-15.
[8] Sources: This study; IUCN Red List Assessments; DAO 2004-15

Plate 3-12. Direct Observation Site No. 17 showing a herd of grazing cows (*Bos taurus*) with unidentified egret species (*Egretta* sp.) flying onto the tree.

Plate 3-13. Direct Observation Site No. 16 showing a grazing carabao (*Bubalus bubalis*) with cattle egret (*Bubulcus ibis*).

Only one flying mammal was noticed to be present in the project area by the key informants. Pointing to the illustration of a large bat, which key informants called as "kabog" with presence timed with the flowering and fruiting of the "kapok" (*Ceiba pentandra*) tree. Indicative species based on IUCN Red List Distribution Maps would be *Pteropus vampyrus* (Large flying fox) categorized as "Near threated" and listed in DAO 2004-15 as "Other threatened species."

In total, 99 wildlife species were noted for the proposed project area from 2008 to 2019. Among these avifauna (87), herpetofauna (4) and mammals (8), only twelve (12%) are endemics. This low rate of endemism is expected considering the long history of human influence in the proposed project area. In contrast, Ong et al. (2002) reported an average of 55% endemism among Philippine taxa.

Notably, a large proportion (30%) of the species is migrant. This seasonal abundance and faunal movement present a unique challenge to the proposed project.

3.1.4.2.3 Key Project Impacts to Wildlife Fauna

Construction Phase

Direct loss of habitats, habitat fragmentation, and degradation

Land clearing, diggings and stockpiling of materials during construction will result in loss, fragmentation, and degradation of habitats for terrestrial fauna, especially in Direct Observation Sites No. 1, 17, 18, 20, 21 and 22 that are mostly grassy areas. However, the land in the proposed project area has a history of long-term use as farmland, commercial and residential, even as it is now undergoing wide-scale urbanization. The other 16 sites have already been built-up into commercial, industrial and residential areas and are already colonized by urban tolerant bird species.

Loss of habitat, habitat fragmentation and degradation for terrestrial fauna can be mitigated by maintaining green spaces during construction. After construction, remaining cleared land can be replanted with bird diversity-related trees such as *Trema orientalis* ("anabiong", pigeon wood), *Ficus* spp. ("balete", fig) and *Tamarindus indica* ("sampalok", tamarind) and other such native/endemic plants.

Road kills of terrestrial fauna

Road kills can occur during the transport of construction materials, personnel and machinery into the proposed project area as well as removing waste and disposables. Key informants mentioned snakes crossing the roadway being hit, injured or killed by vehicles.

This impact can be mitigated by implementing road safety standards and speed limits when using the access roads. Drivers of construction-related vehicles should be informed of the road safety standards. Personnel in the construction teams need to be informed of policies and actions required to apply on injured terrestrial fauna. All injured or dead terrestrial fauna needs to be reported and disposed of in compliance with DENR standards.

Collection/gathering of terrestrial fauna by construction-related personnel

Key Informants have mentioned that terrestrial fauna may become vulnerable to collection during certain periods of the year.

Construction-related personnel need to be informed of policies and actions preventing the collection and the penalties for breaking such wildlife conservation laws and company policies.

Erosion/runoff of bare soil and waste construction-related material

Rains will erode unprotected soil exposed by construction activities, as well as waste construction-related material while runoff silts the waterways, thus degrading habitats of aquatic birds, amphibians and other such wildlife.

Soil exposed by construction activities and waste construction material should be covered appropriately. After construction, the exposed areas should be re-vegetated using bird species-related plants. A waste construction material management plan should be established and implemented to avoid pollution of immediate, surrounding and downstream habitats of terrestrial fauna.

Operation Phase

Collision of terrestrial wildlife with railway components

Although noise, vibration and electrocution impact wild fauna, collision is the main impact of railway components. During operations, terrestrial fauna may collide with the train or railway infrastructure, including power cables. Bird- and bat strikes can occur. The dumpsite can attract insect and rodent eating birds to railway infrastructures. Owls hunting at dawn and dusk are at risk. The East Asian Flyway migration season is from September to March (Lim (n.d.)). Migratory birds at collision risk include: (1) birds moving between LPPCHEA and Laguna Lake habitats; and (2) flocks, such as barn swallows and egrets, that may rest on railway infrastructure.

Personnel in the operations teams need to be informed of policies and actions required to apply on injured terrestrial fauna. All injured and dead terrestrial fauna should be reported and disposed of in a manner compliant with DENR standards. Bird strike data should be regularly assessed to identify points of collision and areas of high collision incidence. A speed of 70 km/hr or less is thought to mitigate owl-train collisions (van Rooyen 2009).

Planting bird diversity-related trees

High bird diversity was observed under *Trema orientalis* ("anabiong", pigeon wood) and *Tamarindus indica* ("sampalok", tamarind).

Replanting cleared land with bird diversity-related trees such as *Trema orientalis* ("anabiong", pigeon wood), *Ficus* spp. ("balete", fig) and *Tamarindus indica* ("sampalok", tamarind) and other such native/endemic plants will increase species richness. Alien invasive plants should not be used in planting.

Elevated railway infrastructure may provide novel nesting habitat for avifauna such as swiftlets (Collocalia spp.)

Swiftlets were observed nesting under a bridgeway in the proposed project area. Swiftlets capable of exploiting overhanging infrastructure as nesting sites will be able to colonize the railway infrastructure and increase in abundance.

Operations-related waste materials will pollute the proposed project vicinities and downstream areas.

During operations, waste is generated including train-derived, commuter-derived, and personnel-derived materials. All of these can pollute the proposed project vicinities and downstream areas (especially when carried by wind and/or rain), thus degrading habitats of terrestrial fauna.

Management plans for all generated wastes, including solid, septage, sewage and hazardous, should be established and implemented during operation. Operations-related personnel should be informed of laws, policies, and actions on these waste management plans, as well as penalties for non-compliance.

3.2 WATER

3.2.1 Hydrology/Hydrogeology

Five river systems drain the project site, namely Imus River, Zapote River, Las Piñas River, Parañaque River, and Alabang River. All the rivers discharge into Manila Bay except for Alabang River which discharges into Laguna Lake. These river systems as well as other river systems within the project's impact areas are briefly described below while the watershed map is presented in **Figure 3-23.** The watershed areas are listed in **Table 3-26**.

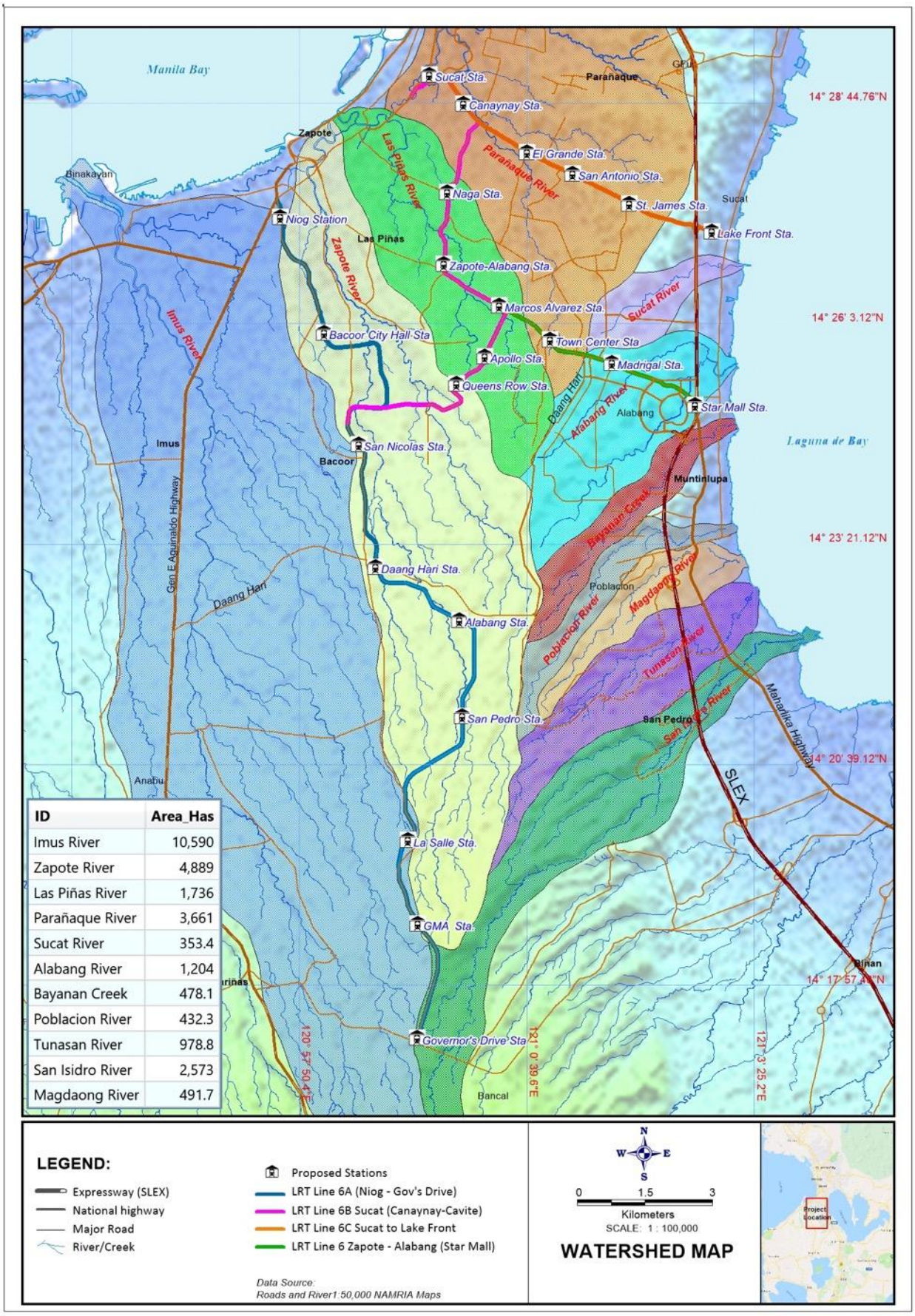
Table 3-26. Features of rivers draining the LRT 6 project sites.

River	Length (km)	Watershed Area (ha)
Imus River	38.4	10,590.0
Zapote River	18.30	4,889.0
Las Piñas River	2.90	1,736.0
Parañaque River		3,661.0
Alabang River	4.5	1,204.0

Imus River is located within Cavite Province and drains the municipalities of Silang, General Trias, Kawit, Noveleta and the cities of Tagaytay and Dasmariñas. It has a drainage area of 105 km^2 and an estimated annual runoff of 168 MCM[9]. The river drains a small portion of the southern part of the LRT Line-6A alignment.

Zapote River is a major river channel that drains Las Piñas and parts of Dasmariñas and Bacoor Cities in Cavite Province. The river has a length of 5.81 km and its estuary is located at Barangay Zapote V of Las Piñas City. The river drains almost the entire alignment of LRT Line-6A and the western-most portion of LRT Line-6B (**Plate 3-14**).

[9] https://dream.upd.edu.ph/assets/Publications/LiDAR-Technical-Reports/MIT/LiDAR-Surveys-and-Flood-Mapping-of-Imus-River.pdf



ID	Area_Has
Imus River	10,590
Zapote River	4,889
Las Piñas River	1,736
Parañaque River	3,661
Sucat River	353.4
Alabang River	1,204
Bayanan Creek	478.1
Poblacion River	432.3
Tunasan River	978.8
San Isidro River	2,573
Magdaong River	491.7

Figure 3-23. Watershed map of the LRT Line 6 Project Alignments.

Plate 3-14. Tributary of Zapote River in the vicinity of Molino Dam and Vista Mall Daang Hari.

Las Piñas River is a northwest-southeast trending river that drains a large portion of Las Piñas City and discharges into Manila Bay in Barangay Elias Aldana. It is connected to Zapote River via the northeast-southwest trending Munting Ilog Creek. The river drains the central portion of the LRT Line-6B alignment (**Plate 3-15**).

Plate 3-15. Las Pinas River in the vicinity of CAA Bridge.

Parañaque River, also known as Tambo River, drains Parañaque City and portions of the cities of Pasay, Makati, Manila, and Taguig. It discharges into Manila Bay at the southern boundary of the reclamation area between Barangays La Huerta and Don Galo of Parañaque City. The river drains the northern segment of LRT Line-6B, the entire alignment of LRT Line-6C, and the western portion of the Alabang-Zapote LRT 6 Alignment (**Plate 3-16**).

Plate 3-16. Parañaque River near Parañaque National High School.

Mangangate River or the Alabang-Cupang River is one of the major tributaries of Laguna Lake. It has a total stream length of 10 km with two branches: the first is connected to the drainage system of Ayala Alabang while the second is connected to the headwater from the NBP Reservation, flowing through Ayala Alabang Village and Filinvest Commercial Area. The two branches connect at Pasong Diablo (**Plate 3-17**) until it drains into Laguna Lake. The river depth varies from 2 to 0.25 m. Alabang River drains the eastern half of the Alabang-Zapote LRT 6 Alignment.

Plate 3-17. Pasong Diablo, a tributary of Alabang River near S&R Warehouse in Muntinlupa City.

Las Piñas – Paranaque River System Water Quality Management Area

Both the Parañaque and Las Piñas Rivers are classified as Class C with the following beneficial uses: fishery water for propagation and growth of fish and other aquatic resources, recreational water for boating, etc., and industrial water supply for manufacturing processes after treatment.

The Las Piñas – Paranaque River System was designated as a Water Quality Management Area (WQMA) by virtue of DENR Administrative Order No. 2018-12 pursuant to Section 5 of RA 9275 or the Philippine Clean Water Act of 2004 in consideration of its critical importance to the cities encompassed by the watershed area. The establishment of the WQMA aims to improve the water quality of the Las Piñas-Paranaque River System and enhance its ecosystem services and benefits including fishing, industrial water use, etc. The WQMA has a total area of 13,586 ha.

The establishment of the WQMA requires the creation of a governing board consisting of representatives from concerned LGUs, national government agencies, people's organizations, water utility companies, business/industry sector and the academe. The governing board shall formulate governing rules and create working committees necessary for the effective implementation of the policies, programs, and activities of the WQMA to protect the Las Piñas-Paranaque River System and promote overall environmental improvement.

3.2.1.1 Change in drainage morphology/inducement of flooding/reduction in stream volumetric flow

The project is not expected to have an impact on drainage morphology nor will it reduce stream volumetric flow. The project can induce localized flooding if siltation control and sediment runoff from the construction sites is not properly managed.

3.2.1.2 Change in stream, lake water depth

The project is not expected to change stream or lake water depth.

3.2.1.3 Depletion of water resources/competition in water use

The project is not expected to deplete water resources. Competition for water resources can occur if water requirement for construction activities will come from the existing water supply of the host communities.

3.2.2 Water Quality

Methodology

Water quality analysis was done through *in situ* measurement as well as collection of water samples from six stations along the alignment of the Project. *In situ* measurement was done for pH, conductivity, total dissolved solids (TDS) and temperature using handheld water quality sampling instruments. Collected water samples were placed in sterile sampling bottles and were brought to CRL Environmental Laboratory for analysis of the following parameters: metals (arsenic, cadmium, copper, lead, mercury, chromium), total and fecal coliforms, dissolved oxygen, biological oxygen demand (BOD), chemical oxygen demand (COD), surfactants, total suspended solids (TSS), oil and grease, ammonia, cyanide, nitrate and phosphate. The location of sampling stations is tabulated in **Table 3-27** and shown on **Figure 3-24** while the sampling test methods used are presented in **Table 3-28**.

Table 3-27. Location of Water Quality Sampling Stations.

Station	°N Latitude	°E Longitude	Location	Landmark
L6-01	14.337498°	120.987243°	Tributary from Molino Dam	Exit gate to Molino-Paliparan Road
L6-02	14.383109°	120.981103°	Tributary from Molino Dam	All Home/Vista Mall Daang Hari
L6-03	14.447139°	120.964502°	Tributary from Zapote River	Housing compound
L6-04	14.479803°	120.998085°	Tributary from Parañaque River	Parañaque National High School
L6-05	14.452746°	120.992698°	Las Piñas River	CAA Bridge
L6-06	14.423833°	121.032940°	Pasong Diablo Creek	S&R Warehouse

Table 3-28. Laboratory Test Methods for Water Quality Parameters.

Parameter	Test Methods
Arsenic	Inductively coupled plasma – optical emission spectroscopy (ICP-OES)
Cadmium	Inductively coupled plasma – optical emission spectroscopy (ICP-OES)
Copper	Inductively coupled plasma – optical emission spectroscopy (ICP-OES)
Lead	Inductively coupled plasma – optical emission spectroscopy (ICP-OES)
Mercury	Manual cold vapor atomic absorption spectroscopy (AAS)
Chromium	Inductively coupled plasma – optical emission spectroscopy (ICP-OES)
Total coliforms	Multiple tube fermentation technique
Fecal coliforms	Multiple tube fermentation technique
Dissolved oxygen	Winkler/Titrimetric
Biological oxygen demand	Aside Modification Winkler
Chemical oxygen demand	Open reflux method
Surfactants	Colorimetry – Chloroform Extraction
Total suspended solids	Gravimetry
Oil and grease	Gravimetry
Ammonia	Phenate method
Cyanide	Ion selective electrode
Nitrate	Colorimetry – Brucine
Phosphate	Stannous Chloride Method

Results

The rivers and creeks passing through the project alignments are mostly perennial and highly polluted being located in densely populated urban areas. **Table 3-29** presents the water quality data of the six sampling stations while **Plate 3-18** shows the photographs of the sampling stations. Laboratory results are shown in **Appendix 14**.

As may be gleaned from **Table 3-29**, values of pH, fecal coliforms and ammonia have exceeded the DENR Standard for Class C water (DAO 2016-08). BOD values have also exceeded the DENR standard in almost all stations except Station 2 which is a tributary of Zapote River located near Vista Mall Daang Hari. Oil and grease values have also exceeded the DENR standard in three stations (Stations 2, 4 and 6).

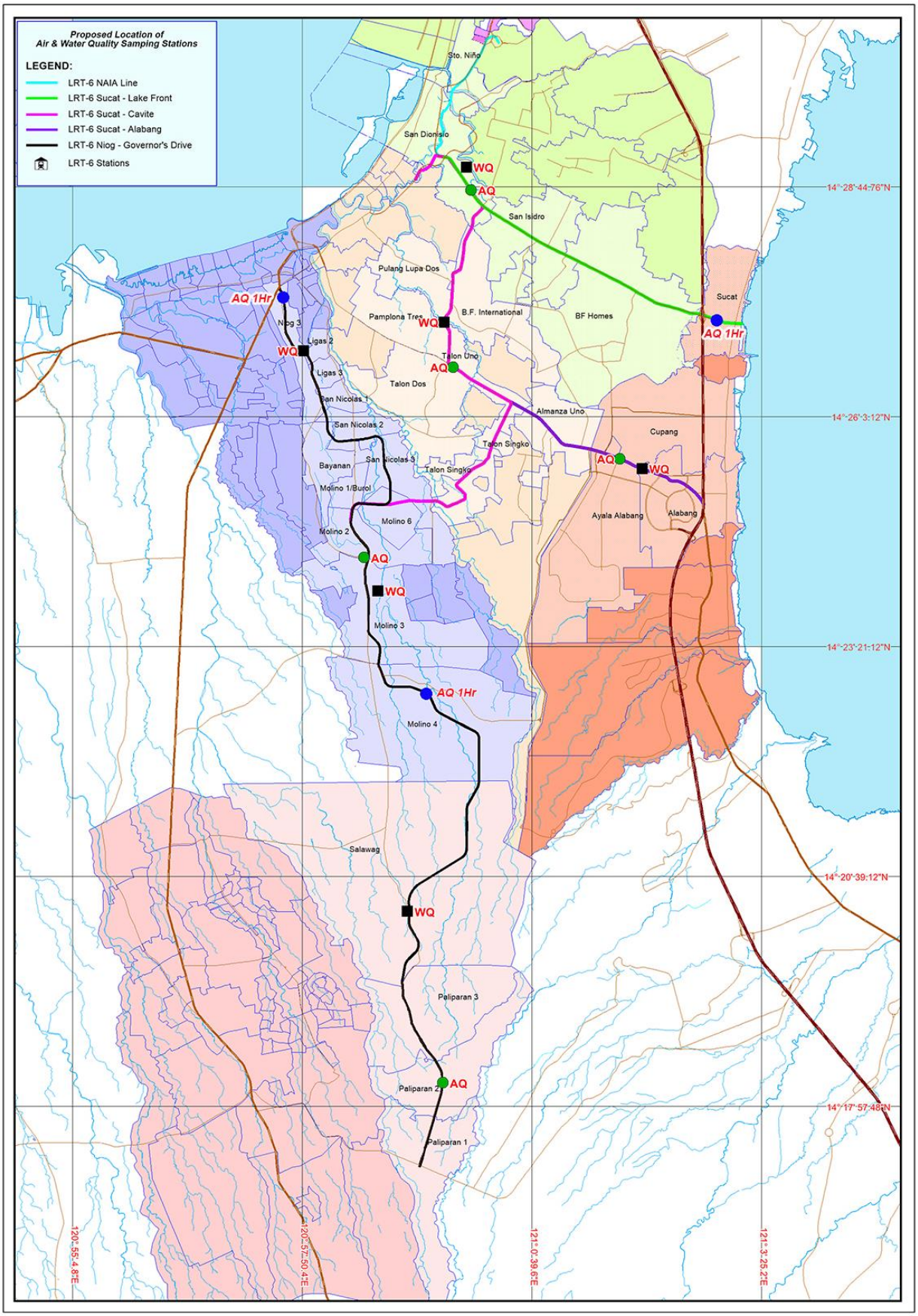


Figure 3-24. Location of water quality and air quality sampling stations.

Table 3-29. Water Quality Data for the LRT 6 Project.

Parameters	Unit	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	DENR Standard
pH		6.19	6.35	6.28	5.96	5.96	6	6.5 – 9.0
Conductivity	uS	626	778	800	792	782	823	
TDS	ppm	449	552	568	564	560	588	
Temperature	^{0}C	27.4	27.5	27.4	27.0	27.4	28.0	25 - 31
Arsenic	mg/L	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	0.02
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.005
Copper	mg/L	<0.003	<0.003	<0.003	<0.001	0.003	0.004	0.02
Lead	mg/L	<0.005	<0.005	<).005	<0.005	<0.005	<0.005	0.05
Mercury	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.002
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01
Total Coliforms	MPN/	3,500,000	160,000	2,400,000	1,700,000.00	540,000.00	540,000.00	
Fecal Coliforms	100mL	1,100,000	54,000	2,400,000	700,000.00	240,000.00	240,000.00	200 / 400*
Dissolved Oxygen	mg/L	<2	2	<2	<2	<2	<2	5
BOD	mg/L	15	6	41	34	23	47	7 / 50*
COD	mg/L	75	48	131	86	69	89	
Surfactants	mg/L		0.2		0.4		0.2	1.5 / 15*
TSS	mg/L	20	9	17	21	18	29	80
Oil & Grease	mg/L	0.62	2.8	1.8	4.2	3.8	2	2 / 5*
Ammonia	mg/L	105	33	24	28	9.6	10	0.05 / 0.5*
Cyanide	mg/L	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.1
Nitrate	mg/L		0.6		0.7		0.5	7 / 14*
Phosphate	mg/L		1.6		0.5		0.2	0.5 / 1*

* DENR Effluent Standards (DAO 2016-08); values in Red font indicate exceedance from DENR Standard for Class C Water (DAO 2016-08)

Graphs of water quality data are presented in **Figures 3-25** to **3-28**.

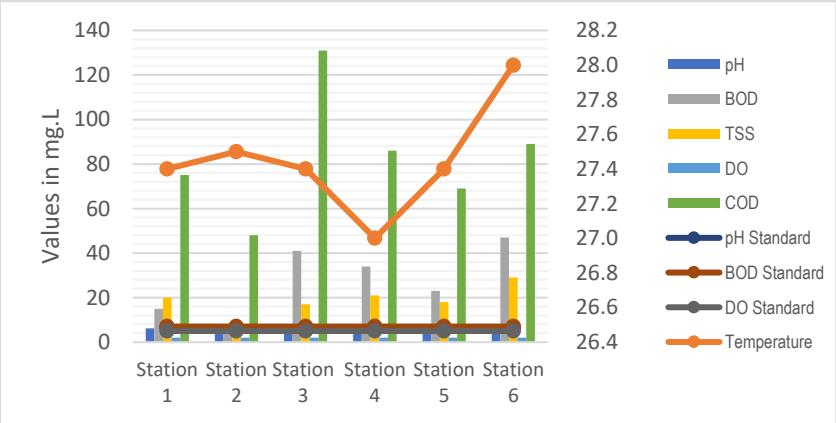


Figure 3-25. Graph of values of selected water quality parameters.

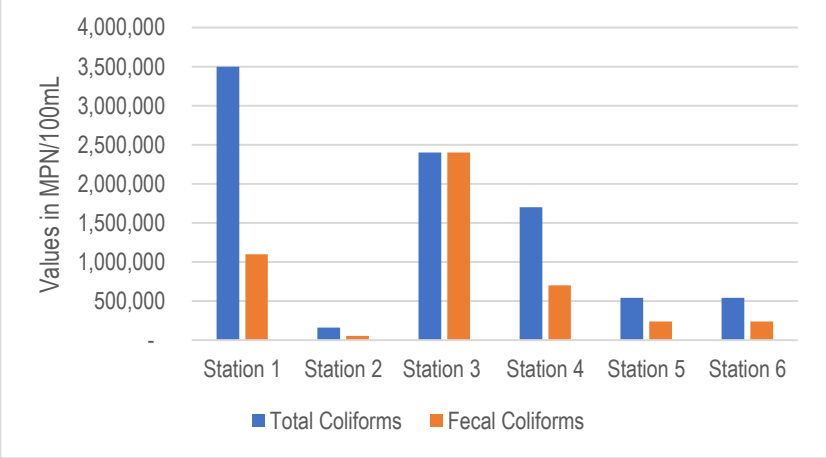


Figure 3-26. Plot of total and fecal coliform values of water samples from LRT 6 sampling stations.

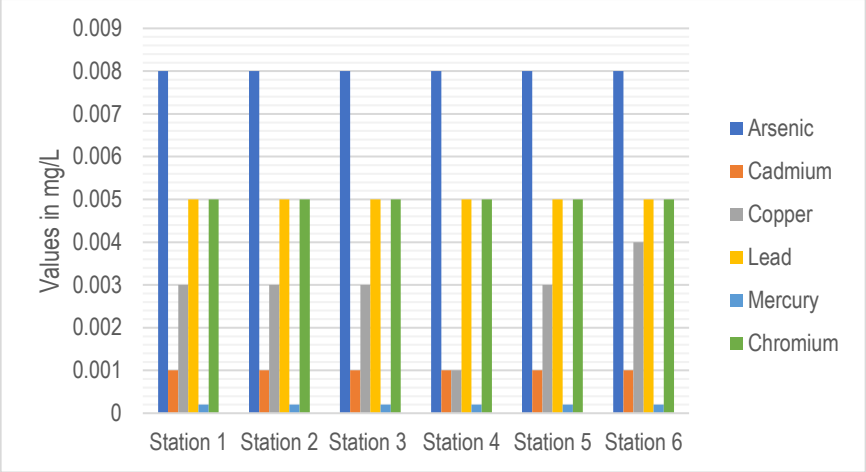


Figure 3-27. Plot of metal values of water samples from LRT 6 sampling stations.

Figure 3-28 presents the water quality values in terms of compliance to DENR effluent standards. It may be gleaned from the figure that BOD, nitrate, oil and grease and surfactants values are within the DENR effluent standards while ammonia values are above the DENR effluent standards. Phosphate value of Station 2 was also above the DENR effluent standard. **Table 3-29** and **Figure 3-28** also show that fecal coliform values are above the DENR effluent standard. Exceedances in DENR effluent standards for ammonia, fecal coliform and phosphate can be attributed to human wastes discharged into the rivers and creeks traversing the project alignments.

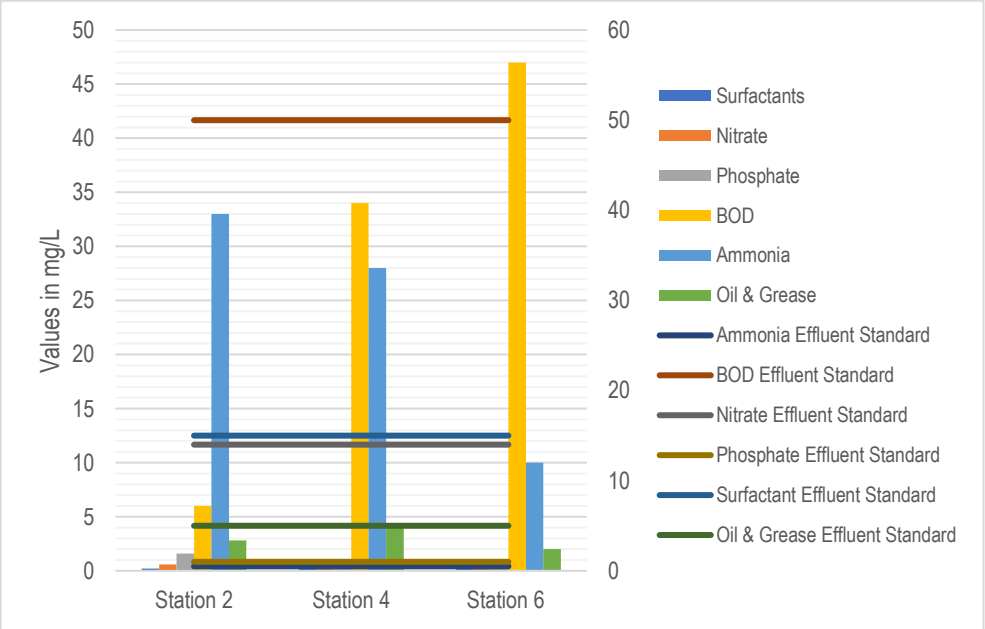


Figure 3-28. Compliance of wastewater discharge to DENR Effluent Standards.

Station 2 (Zapote River) near Vista Mall Daang Hari.

Station 3, a tributary of Zapote River.

Station 4 (Parañaque River) near Paranaque National High School.

Station 5 (Las Piñas River) near CAA Bridge.

Plate 3-18. Selected water quality sampling stations for the LRT 6 project.

3.2.2.1 Degradation of groundwater quality

Degradation of groundwater quality is not expected considering that the foundation for the project structures are nor expected to exceed 30 m depth. Groundwater data from the Local Water Utilities Administration (LWUA)[10] indicate that deep wells within the host LGUs generally exceed 100 m depth with some as deep as 300 m. Shallower wells are located in some areas in Bacoor and Dasmariñas but none are located along the existing roads where the project alignment will pass through. Shallow wells and deep wells are generally located in subdivisions and large commercial and mixed-use developments in the host cities.

3.2.2.2 Degradation of surface water quality

Degradation of surface water quality is expected during the construction phase. Silt-laden surface runoff from active construction sites can drain into nearby surface water bodies unless silt control and protection measures are in place.

[10] http://122.54.214.222/databank/well.asp?prov=NC4&province=Metro%20Manila,%204th&mun=MUN&munic=Muntinlupa&pg=3 http://122.54.214.222/databank/well.asp?prov=NC4&province=Metro%20Manila,%204th&mun=PAR&munic=Paranaque%20City&pg=7 http://122.54.214.222/databank/Well.asp?prov=NC4&province=Metro%20Manila,%204th&mun=PIN&munic=Las%20Pi%F1as%20City&pg=1; http://122.54.214.222/databank/well.asp?prov=CAV&province=Cavite&mun=BAC&munic=Bacoor%20City&pg=2 http://122.54.214.222/databank/well.asp?prov=CAV&province=Cavite&mun=DAS&munic=Dasmarinas&pg=4

3.2.3 Freshwater Ecology

Freshwater ecology was not included in the EIS due to the severely polluted nature of the rivers and creeks traversing the project alignments. The rivers and creeks traversing the project alignments are secondary impact areas and receive solid and liquid waste discharges from the communities and establishments located along their banks (see Section 3.2.2 on Water Quality). Specifically, the values of dissolved oxygen and BOD have exceeded the DENR Standard for Class C water (DAO 2016-08). It has been reported that freshwater ecosystems with DO values of 4 to 5 mg/l are able to support a large population of various fish species but even robust fish species begin to die when the level of DO drops below 3 mg/l[11]. Depressed DO levels also result in a shift of aquatic community structure with species that are more tolerant to polluted waters such as nuisance algae and anaerobic organisms. As such, the rivers within the vicinity of the project alignments that have DO levels of <2mg/L or 2mg/L do not meet the criteria for Class C waters with the following beneficial uses: fishery water for propagation and growth of fish and other aquatic resources, recreational water for boating, etc., and industrial water supply for manufacturing processes after treatment.

3.3 AIR

3.3.1 Meteorology/Climatology

This section describes the existing meteorological conditions at the project alignment using available secondary data.

3.3.1.1 Methodology

Existing Conditions

In the absence of onsite meteorological measurements, records from the PAGASA stations at Sangley Point and NAIA were used to describe the potential meteorology at the area of the project alignment (**Figure 3-29**). The secondary data used are enumerated below.

a) Climatological normals from 1981 to 2010 (**Table 3-30**, **Table 3-32**);

b) Climatological extremes as of 2018 (**Table 3-31**, **Table 3-33**);

c) Climate map of the Philippines (**Figure 3-30**);

d) Wind rose data (**Table 3-34**);

e) Tropical cyclone frequency map (**Figure 3-30**); and

f) Map of tropical cyclones crossing Metro Manila and Cavite (**Figure 3-38**, **Figure 3-39**).

[11] Source: https://www.water-research.net/index.php/dissovled-oxygen-in-water. Accessed 24 May 2019.

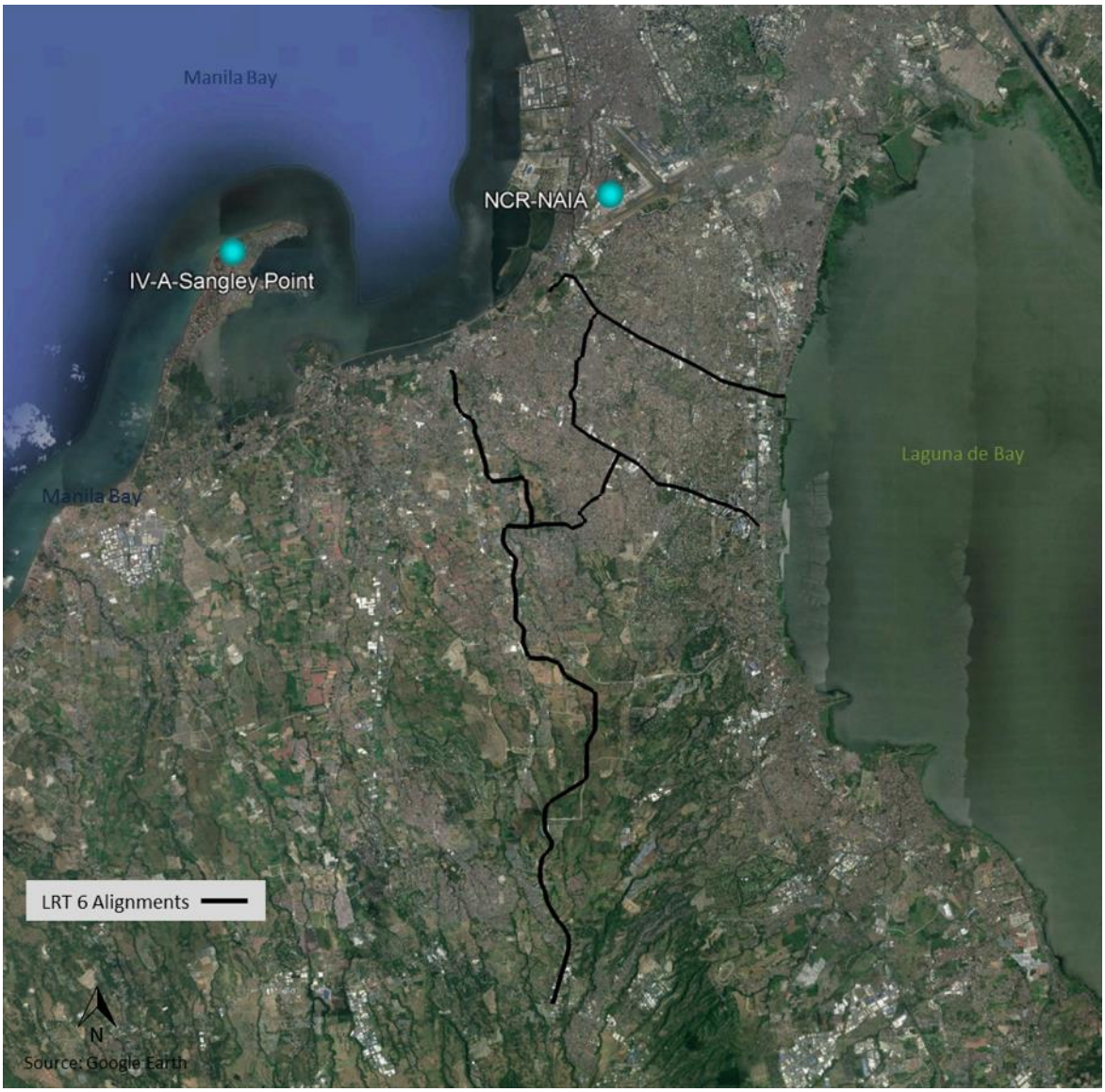


Figure 3-29. PAGASA stations near the project alignment.

Table 3-30. Climatological normals at the PAGASA station in NAIA (1981-2010).

Month	Rainfall		Temperature, °C						Vapor pressure	Relative humidity	MSLP	Wind		Cloud amount
	Amount	No. of RD	Max	Min	Mean	Dry bulb	Wet bulb	Dew pt				Direction	Speed	
	mm	#	°C	°C	°C	°C	°C	°C	mbs	%	mbs	16 pt	m/s	okta
JAN	6.8	2	30.2	22	26.1	26	22.6	21.2	25.1	75	1013.4	E	3	5
FEB	4.2	1	31	22.5	26.7	26.6	22.7	21.1	24.9	72	1013.2	E	3	4
MAR	4	1	32.5	23.6	28	27.9	23.4	21.7	25.7	68	1012.4	E	4	4
APR	16	1	34.1	25	29.5	29.4	24.5	22.7	27.4	67	1010.8	ESE	4	4
MAY	70.4	10	33.8	25.5	29.7	29.4	25.3	23.9	29.4	72	1009.3	W	3	5
JUN	265.2	14	32.5	25.1	28.8	28.5	25.3	24.2	30	77	1008.7	W	3	6
JUL	316.7	16	31.3	24.6	28	27.7	25.1	24.2	30.1	81	1008.4	W	3	6
AUG	418.4	19	30.8	24.6	27.7	27.4	25.1	24.3	30.3	83	1008	W	3	7
SEP	255.2	16	31	24.6	27.8	27.5	25.2	24.4	30.5	83	1008.8	W	2	6
OCT	283.4	14	31.1	24.3	27.7	27.5	24.8	23.8	29.4	80	1009.6	E	2	6
NOV	99	8	31.1	23.7	27.4	27.2	24.2	23.1	28.1	78	1010.8	E	2	5
DEC	28.6	3	30.2	22.7	26.5	26.3	23.1	21.9	26.1	76	1012.5	E	2	5
ANNUAL	1767.9	183	26.2	20.0	23.1	22.7	21.4	20.9	24.9	89	1010.1	NE	3	5

Source: PAGASA; mm – millimeters; RD – rainy days; pt – point; mbs – millibars; MSLP – mean sea level pressure

Table 3-31. Climatological extremes recorded at the PAGASA station in NAIA as of 2018

Month	Temperature, °C				Greatest daily rainfall (mm)		Strongest winds (mps)			Sea level pressures (mbs)			
	HIGH	DATE	LOW	DATE	AMOUNT	DATE	SPD	DIR	DATE	HIGH	DATE	LOW	DATE
JAN	35.8	01-07-1989	14.8	01-18-1961	55.3	01-03-1970	20	ENE	01-12-1986	1022.3	01-27-1987	1004.4	01-01-1950
FEB	35.1	02-21-1998	14.6	02-01-1962	20.5	02-18-2017	20	E	02-28-1988	1021.4	02-01-1998	1003.8	02-21-2001
MAR	36.5	03-30-1978	16.0	03-03-1963	36.0	03-07-2011	26	E	03-29-1992	1021.1	03-02-1987	1002.4	03-06-1999
APR	37.8	04-23-1948	18.7	04-01-1994	63.0	04-04-1992	22	ESE	04-06-1986	1019.9	04-23-1987	1002.8	04-21-2001
MAY	38.2	05-18-2014	19.1	05-11-1950	229.1	05-27-1960	31	SW	05-22-1976	1015.9	05-09-1957	992.2	05-17-1989
JUNE	38.0	06-02-1991	20.0	06-22-1954	353.8	06-01-1958	36	S	06-29-1964	1016.0	06-07-1997	974.6	06-29-1964
JULY	36.4	07-26-2016	18.3	07-28-1948	472.4	07-20-1972	36	W	07-08-1986	1014.9	07-07-1953	990.1	07-16-2014
AUG	36.5	08-15-2017	17.4	08-09-1949	401.8	08-10-1947	30	WSW	08-16-1984	1015.2	08-12-1958	992.8	08-24-1978
SEP	35.6	09-08-2017	19.1	09-15-1950	228.9	09-08-1963	40	NNW	09-28-2006	1016.2	09-18-2005	986.7	09-30-1995
OCT	36.0	10-24-1976	18.0	10-23-1981	274.5	10-09-1978	27	W	10-18-1985	1017.0	10-25-1986	977.9	10-14-1970
NOV	35.8	11-17-1972	17.2	11-26-1949	121.7	11-14-1977	56	W	11-19-1970	1019.4	11-03-1989	899.4	11-03-1995
DEC	34.2	12-29-1978	16.3	12-18-1955	125.5	12-15-2015	25	NW	12-30-1950	1020.9	12-08-1960	995.5	12-02-2004
Annual	38.2	05-18-1969	14.6	02-01-1962	472.4	07-20-1972	56	W	11-19-1970	1022.3	01-27-1987	899.4	11-03-1995
Period	1947-2018				1949-2018		1950-2018			1950-2018			

Source: PAGASA; mbs – millibars; SPD – speed; mps – meters per second; mm- millimeter

Table 3-32. Climatological normals at the PAGASA station in Sangley Point (1981-2010)

Month	Rainfall		Temperature, °C						Vapor pressure	Relative humidity	MSLP	Wind		Cloud amount
	Amount	No. of RD	Max	Min	Mean	Dry bulb	Wet bulb	Dew pt				Direction	Speed	
	mm	#	°C	°C	°C	°C	°C	°C	mbs	%	mbs	16 pt	m/s	okta
JAN	16.9	4	30	23.3	26.6	26.8	23.9	22.8	27.7	79	1012.5	ESE	3	5
FEB	11.1	2	30.8	23.6	27.2	27.4	24.1	22.9	27.7	76	1012.7	ESE	3	5
MAR	9.4	2	32.7	24.6	28.6	28.7	25	23.7	29.1	74	1012.1	ESE	3	4
APR	18.5	2	34.4	25.9	30.1	30.3	26	24.6	30.6	71	1010.5	ESE	3	4
MAY	139.1	10	34.1	26.1	30.1	30.3	26.5	25.3	32	74	1008.8	ESE	3	5
JUN	264.5	15	32.8	25.8	29.3	29.5	26.4	25.4	32.3	78	1008.4	ESE	3	6
JUL	422.4	20	31.7	25.3	28.5	28.6	26	25.1	31.8	81	1008	W	3	6
AUG	457.2	21	31.3	25.2	28.3	28.2	25.8	25	31.5	83	1007.6	SW	3	7
SEP	341.8	19	31.4	25.2	28.3	28.4	25.9	25.1	31.7	82	1008.4	W	3	6
OCT	224.3	15	31.4	25.3	28.4	28.4	25.8	24.9	31.4	81	1009.3	ESE	3	6
NOV	110.5	11	31.1	25	28.1	28.1	25.3	24.3	30.3	80	1010.4	ESE	3	6
DEC	62.7	7	30	23.9	27	27.1	24.3	23.3	28.4	79	1011.9	ESE	3	5
ANNUAL	1970.2	176	32	23	27.5	27.2	24.7	23.8	29.5	81		NE	2	5

Source: PAGASA; mm – millimeters; RD – rainy days; pt – point; mbs – millibars; MSLP – mean sea level pressure

Table 3-33. Climatological extremes recorded at the PAGASA station in Sangley Point station as of 2018

Month	Temperature, °C				Greatest daily rainfall (mm)		Strongest winds (mps)			Sea level pressures (mbs)			
	HIGH	DATE	LOW	DATE	AMOUNT	DATE	SPD	DIR	DATE	HIGH	DATE	LOW	DATE
JAN	34.8	01-25-1999	19.0	01-03-1982	94.0	01-12-1977	17	ESE	01-19-2010	1023.4	01-16-1999	1001.9	01-31-2001
FEB	35.2	02-28-1998	18.0	02-01-1982	45.8	02-06-2016	15	ESE	02-27-1992	1020.3	02-14-2017	1005.4	02-21-2001
MAR	36.6	03-29-1981	19.1	03-25-1980	102.2	03-21-2018	24	ESE	03-23-1998	1020.5	03-05-2005	1003.9	03-06-1999
APR	37.8	04-07-1983	21.5	04-03-2007	53.9	04-24-1975	16	ESE	04-05-1996	1017.5	04-14-1993	1002.0	04-30-1988
MAY	38.5	05-16-1987	22.0	05-15-1980	237.1	05-26-1997	27	SW	05-22-1976	1015.5	05-25-1983	993.4	05-22-1976
JUN	38.4	06-04-1987	22.0	06-16-1981	172.4	06-27-1985	25	SE	06-08-2011	1014.3	06-08-1997	997.6	06-28-2004
JUL	36.3	07-25-2007	21.2	07-15-1982	231.4	07-20-2002	54	E	07-13-2010	1013.8	07-29-1983	986.1	07-15-2014
AUG	36.5	08-16-2009	22.0	08-02-1994	475.4	08-19-2013	30	W	08-18-1990	1014.5	08-13-2005	998.1	08-17-1990
SEP	35.6	09-02-1996	21.0	09-16-1979	275.4	09-22-2013	44	NNW	09-28-2006	1015.6	09-18-2005	984.3	09-28-2006
OCT	35.8	10-08-1996	21.0	10-24-1988	260.7	10-05-1986	45	NW	10-21-1994	1016.4	10-27-1993	990.3	10-21-1994
NOV	36.4	11-08-1978	21.5	11-26-1982	171.2	11-02-2000	49	NW	11-03-1995	1017.5	11-30-1989	977.0	11-03-1995
DEC	34.0	12-06-1998	20.0	12-24-1985	131.3	12-10-2006	22	NNW	12-05-1993	1019.1	12-31-1992	997.9	12-02-2004
Annual	38.5	05-16-1987	18.0	02-01-1982	475.4	08-19-2013	54	E	07-13-2010	1023.4	01-16-1999	977.0	11-03-1995
Period	1974 -2018				1974-2018		1974 -2018			1974 -2018			

Source: PAGASA; mbs – millibars; SPD – speed; mps – meters per second; mm- millimeter

Impact assessment

Change in local micro-climate

Climate change projections in 2020 and 2050 for NCR and Cavite based on the paper "Climate Change in the Philippines, 2011" published by the PAGASA were used to describe potential rainfall and temperature changes at the project alignment. The projections were based on climate normals using the medium-range emission scenario (A1B) defined by the IPCC as:

> *A1: The A1 storyline and scenario family describe a future world of very rapid economic growth, a global population that peaks mid-century and declines thereafter, and a rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building, and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. The A1 scenario family is further developed into three groups that describe alternative directions of technological change in the energy system. The three A1 groups are distinguished by their technological emphasis: fossil-intensive (A1FI), non-fossil energy sources (A1T), or balanced across all sources (A1B) (where balanced is defined as not relying too heavily on one particular energy source, on the assumption that similar improvement rates apply to all energy supply and end use technologies).*

Contribution in terms of greenhouse gas emissions

Quantifying GHG is done by using emission factors and information about the source. For example, fuel type and consumption are required for fuel burning equipment to use GHG emission factors. Due to the data limitations for the LRT6 at this time, the GHG emissions were calculated using the metric developed by Hanson and Noland (2012) for the Model of Construction GHG Emissions from Rail Transit Capital Projects[12].

The model developed a GHG emission metric that can be applied using data readily available during project development, including track-miles by alignment and propulsion type, the number of stations by type, the number of parking spaces by type, and rolling stock.

The emission factors used to estimate GHG emissions during construction are shown in **Table 3-34**. The emissions were converted to its Global Warming Potential (GWP) in carbon dioxide equivalents for a 100-year time horizon. The GWP is a measure of heat a GHG traps in the atmosphere in a specific time horizon, relative to carbon dioxide. The GWP factors used is shown in **Table 3-35**.

Table 3-34. GHG emission factors for concrete LRT platforms and stations

GHG	Unit	Platform	Station
CO_2	MT/unit	150.40	5180.80
CH_4	MT/unit	0.136	4.70
N_2O	MT/unit	0.012	0.40

Source: Hanson and Noland (2012)

Table 3-35. 100-year horizon GWP

GHG	GWP
CO_2	1
CH_4	28
N_2O	265

Source: Ref. **Error! Reference source not found.**

[12] Appendix G, National Academies of Sciences, Engineering, and Medicine 201 2. Assessing and Comparing Environmental Performance of Major Transit Investments. Washington, DC: The National Academies Press. https://doi.org/1 0.1 7226/22787

3.3.1.2 Existing Conditions

Climate

The project alignment falls in an area classified as Type I climate based on the Modified Coronas Classification of the Philippine Climate (**Figure 3-30**). The seasons are pronounced in a Type I climate; dry from November to April and wet rest of the year.

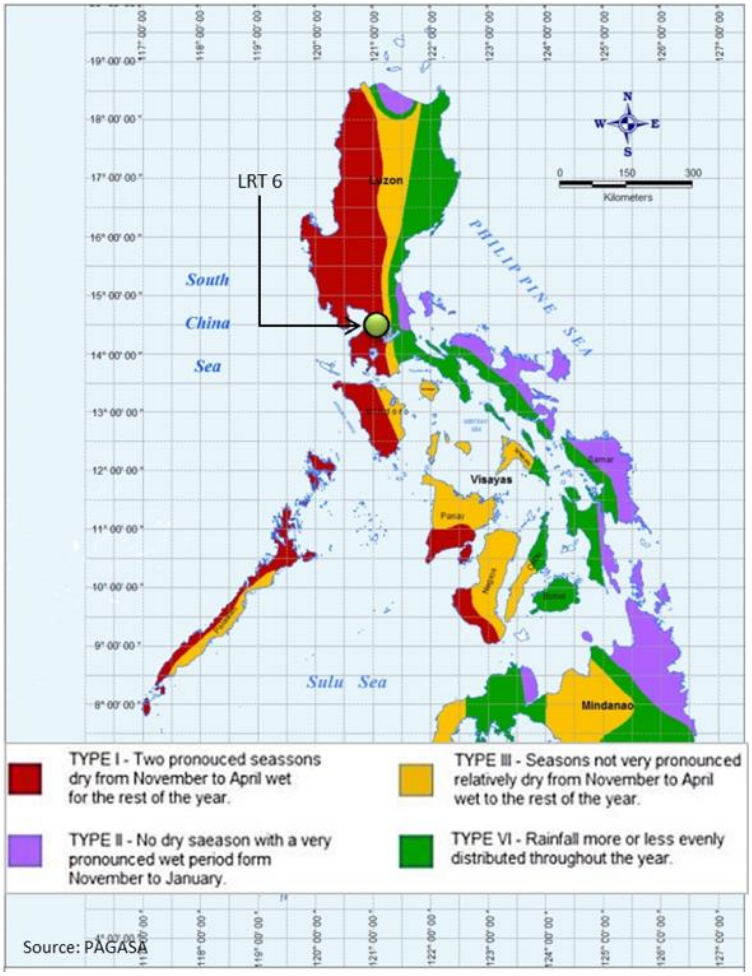


Figure 3-30. The project on the modified Coronas classification of Philippine climate

Rainfall

The alignment may experience an annual rainfall of 1,768 to 1,970 mm with minimum and maximum monthly precipitation of four to 457 mm (**Table 3-30**, **Table 3-32**). Following the characteristic of a Type I climate, the wet season starts in May, peaks in August, and tapers off until December (**Figure 3-31**). The number of rainy days at the alignment in a year may range from 176 to 183 days and may experience an extreme daily rainfall range of 21 to 475 mm (**Table 3-31**, **Table 3-33**).

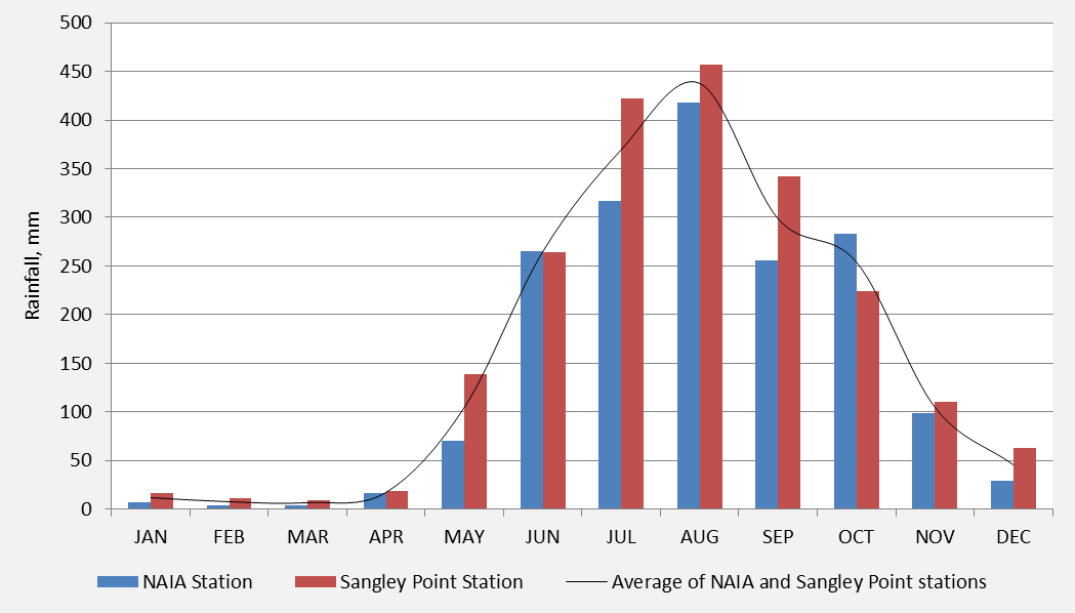


Figure 3-31. Potential monthly rainfall at the project alignment.

Surface temperatures

The alignment may experience mean monthly temperatures of 26.1°C to 30.1°C in January and April to May respectively. The peak temperatures may occur in April and May, decreasing to a relatively constant temperature from July to October, and finally decreasing to reach the minimum in January (**Figure 3-32**). The potential extreme monthly temperature at the site will range from 15 to 39°C (**Table 3-31**, **Table 3-33**).

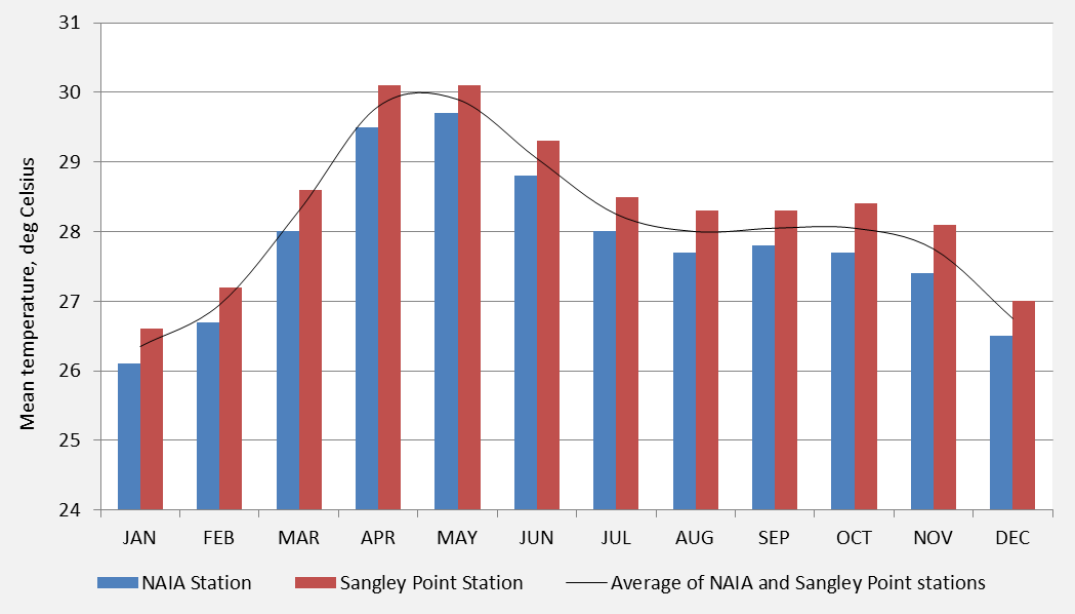


Figure 3-32. Potential monthly temperatures at the project alignment.

Relative humidity

Relative humidity is expressed in percentage of water vapor present in air using psychrometric charts with the dry- and wet-bulb temperatures as input. The monthly relative humidity at the project alignment may range from 67% to 83% with July to November as the most humid months (**Figure 3-33**).

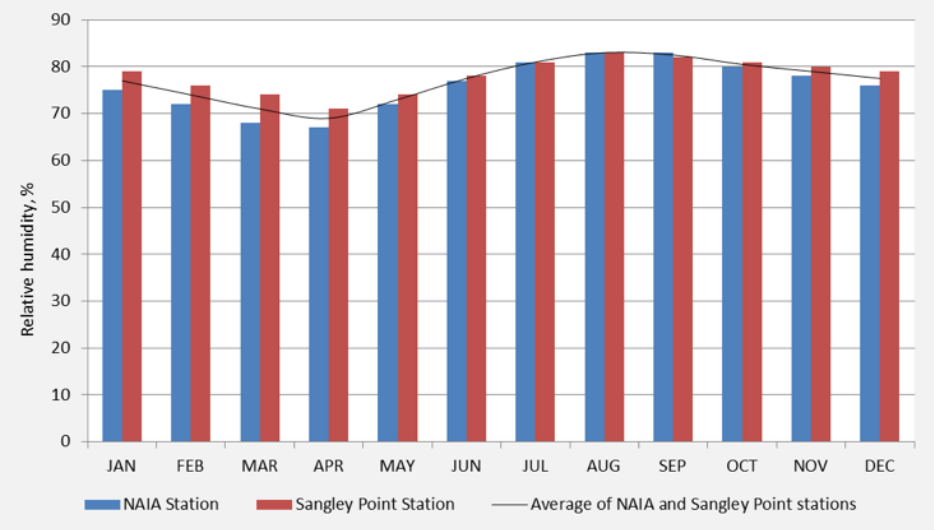


Figure 3-33. Potential monthly relative humidity at the LRT 6 alignment

Cloudiness

Cloud cover controls insolation, i.e., the amount of sunlight reaching land. Cloud cover is inversely proportional to insolation, i.e., more clouds, less insolation, and therefore less heating of the earth's surface. It is useful in estimating atmospheric stability when onsite solar radiation measurements are unavailable. The monthly cloud cover at the LRT alignment may range from two to four okta with an annual mean of five (**Table 3-30**, **Table 3-32**). High cloud cover from June to October indicates the wet season characterizing a Type 1 climate (**Figure 3-34**).

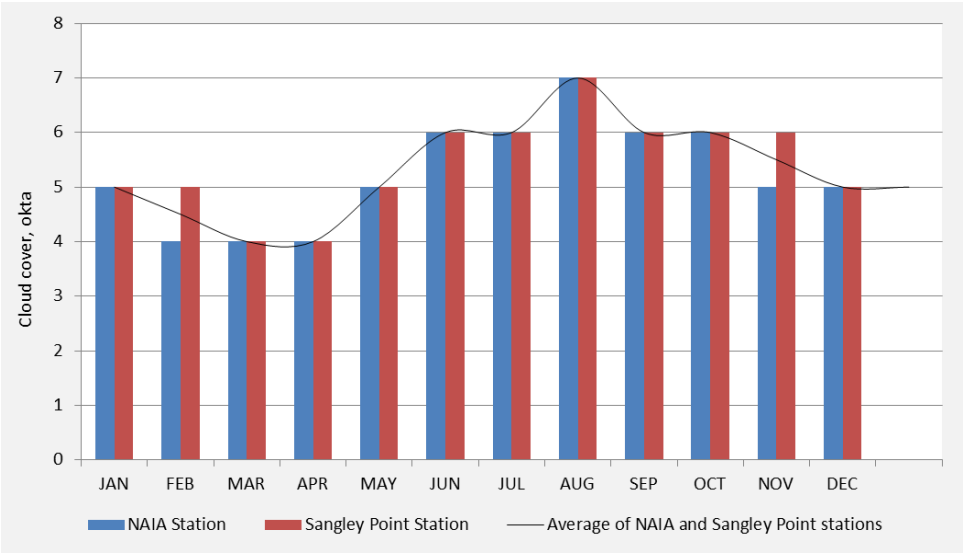


Figure 3-34. Potential monthly cloud cover at the LRT 6 alignment

Surface Winds

The possible dominant wind directions at the alignment are east, east-southeast, west, and north with dominant wind speeds ranging from one to four meters per second. In extreme cases, wind speeds at the site may range from 15 to 56 meters per second (**Table 3-36**).

Table 3-36. Potential wind speeds and directions at the project alignment.

NAIA													
Direction	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
N	1.3	0.6	1.3	0.1	0.6	0.7	0.7	0.4	1.2	2.5	4.3	4.2	1.5
NNE	2.7	1.3	0.6	0.2	0.2	0.6	0.5	0.2	1.1	1.4	3.4	5.1	1.4
NE	1.8	0.2	0	0.1	0.4	0.4	0.6	0.4	0.4	1.9	4.4	2.7	1.1
ENE	2.6	1.7	0.9	0.8	0.9	0.6	0.8	1.2	1.4	5.6	8	5.2	2.5
E	44.3	43.4	42.7	35.7	22.8	14.3	9.8	4.6	8.9	20.4	36.6	45.5	27.4
ESE	32.8	39.7	40.1	41.6	23.2	14.6	7.7	4.2	6.5	16.4	20.8	21.4	22.4
SE	4.8	6.9	7.9	8.1	6.9	5.6	3.4	2.6	3.6	5.6	5.1	4.5	5.4
SSE	0.9	1.2	0.5	0.8	2	1.7	1.8	1	1.2	1.7	1.3	0.6	1.2
S	0.3	0.2	0.1	0.6	1.1	2.8	1.7	1.2	2.1	2.6	0.9	0.2	1.2
SSW	0.1	0.2	0.4	0.4	0.9	3	3.3	3	2.7	1.1	0.4	0.2	1.3
SW	0.1	0.2	0.3	0.2	2.8	4.3	7.5	8.9	8.1	2.2	0.5	0.2	2.9
WSW	0.4	0.4	1.1	2.3	10.3	12.2	18.8	21.8	15.6	7.4	1.6	0.8	7.7
W	4.4	2.7	2.8	7.1	25.1	35.5	37	44.7	38.1	19.4	6.6	5.5	19.1
WNW	2.5	0.9	0.8	1.6	1.8	2.3	4.4	3.9	5.1	7.3	2.6	1.9	2.9
NW	0.3	0.4	0.3	0.3	0.8	1	1	1.2	1.8	2.3	1.9	1	1
NNW	0.5	0	0	0.1	0.3	0.3	0.4	0.6	1.4	1.6	1.5	0.8	0.6
Sangley Pt.													
Direction	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
N	14.7	8	4.7	6.1	8.1	10	10.6	9.8	11.9	16.3	18.2	20.1	11.5
NNE	4	1.9	2.4	0.4	1	0.9	1.2	0.6	1.3	2.6	7.7	10	2.8
NE	1.3	0.7	0.5	0.1	0.4	0.3	0.4	0.5	1.1	2.4	3.2	3.1	1.2
ENE	1.5	1.7	0.4	2	1.4	0.8	0.3	0	0.2	1.5	1.8	1.6	1.1
E	15.2	18.4	16.7	11.7	7.1	4.1	3.1	2	2.1	7.7	12.9	14.4	9.6
ESE	42.5	50.9	57.4	54.3	30.9	19.8	12.8	5.6	14	24.5	35.7	34.4	31.9
SE	5.2	5.3	6.2	8.6	6.2	5.3	2.9	2.3	3.4	5.6	4	2.9	4.8
SSE	3.9	4.6	5.1	5	4.2	2.3	1.1	1.4	2	2.9	2.3	1.9	3.1
S	1.5	1.7	0.2	0.8	4	8.2	9.2	7.6	7.3	3.3	1	0.4	3.8
SSW	0.1	0.1	0.2	0.8	0.6	2.9	2.2	3.1	2.4	3.2	0.1	0.1	1.3
SW	0.1	0.1	1	2.6	10.2	12	16.8	21.9	15.6	4.5	1.4	0.5	7.2
WSW	0	0.2	0.2	0.8	8.7	12.7	11.2	18	9.2	3.2	0.7	0.2	5.4
W	0.3	0.2	0.9	1.9	8.5	13	16.1	17	16.3	6.3	0.7	0.1	6.8
WNW	0.4	0.2	0.1	0.8	1.5	1.1	2.6	1.7	2.2	1.9	0.6	1	1.2
NW	4.3	2.4	2.3	2.3	4.7	4.7	6.8	6.6	5.8	7.8	5	3	4.6
NNW	4.8	3.4	1.7	1.4	2.5	1.9	2.6	1.8	5	6	4.8	6.1	3.5

Tropical cyclones

Typical cyclone frequency in the country is highest from June to December. These are associated with the occurrence of low pressures areas (LPA) normally originating over the North Western Pacific Ocean side of the Philippine Area of Responsibility (PAR) and generally moving northwestward. Tropical cyclones also originate in the South China Sea or at the western part of the country, having unusual motions, and quite rare with 52 occurrences in 50 years (Perez, 2001). The PAGASA categorized these cyclones with wind speeds up to 63 kph as tropical depressions (TD); wind speeds from 64-117 kph as tropical storm (TS), and wind speeds over 117 kph as tropical typhoons (TY).

For 46 years (1948-1993), the PAGASA has recorded an annual average of 20 tropical cyclones in the PAR, nine of these making landfalls. Overall, the agency has tracked 917 cyclones within the PAR, with 415 (45.3%) crossing the archipelago and 120 (22.5%) considered disastrous.

In general, the project alignment is located in an area where three cyclones pass every two years (**Figure 3-37**). Records showed that a total of 43 tropical cyclones passed Metro Manila and Cavite from 1948 to 2018 (**Figure 3-38, Figure 3-39**).

Processing of the records showed that one typhoon (**Figure 3-36**) a year may pass the alignment with October having the highest frequency (**Figure 3-35**).

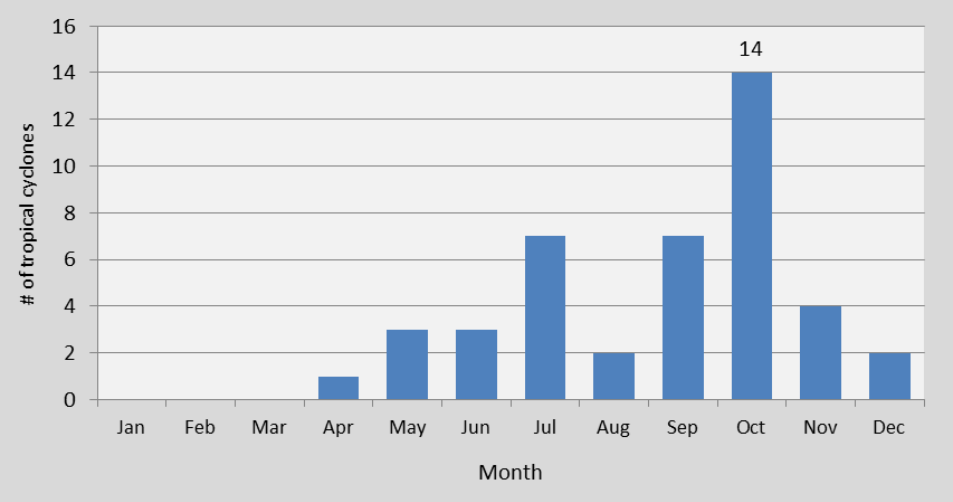


Figure 3-35. Monthly distribution of tropical cyclones crossing Cavite and NCR (1948 – 2018).

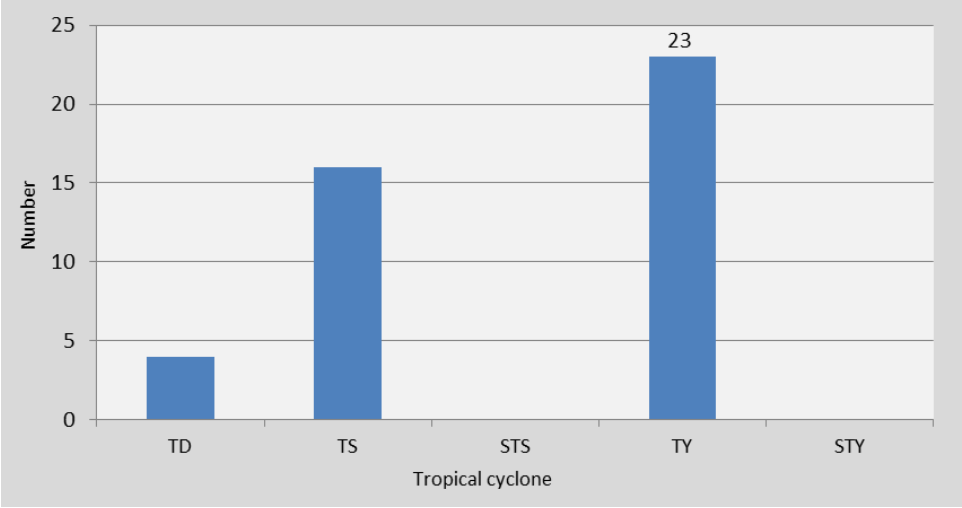


Figure 3-36. Category of tropical cyclones crossing Cavite and NCR (1948 – 2018).

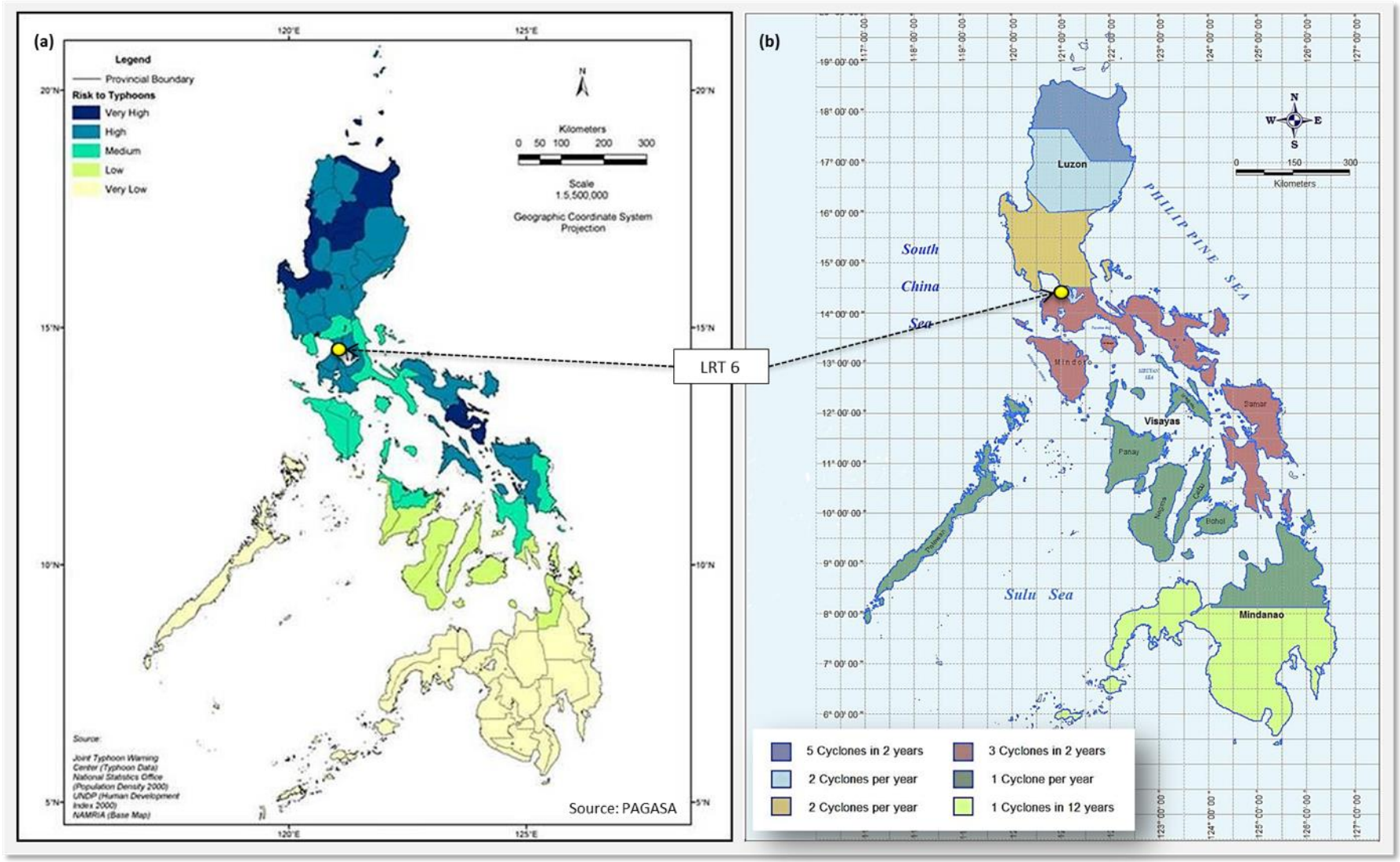
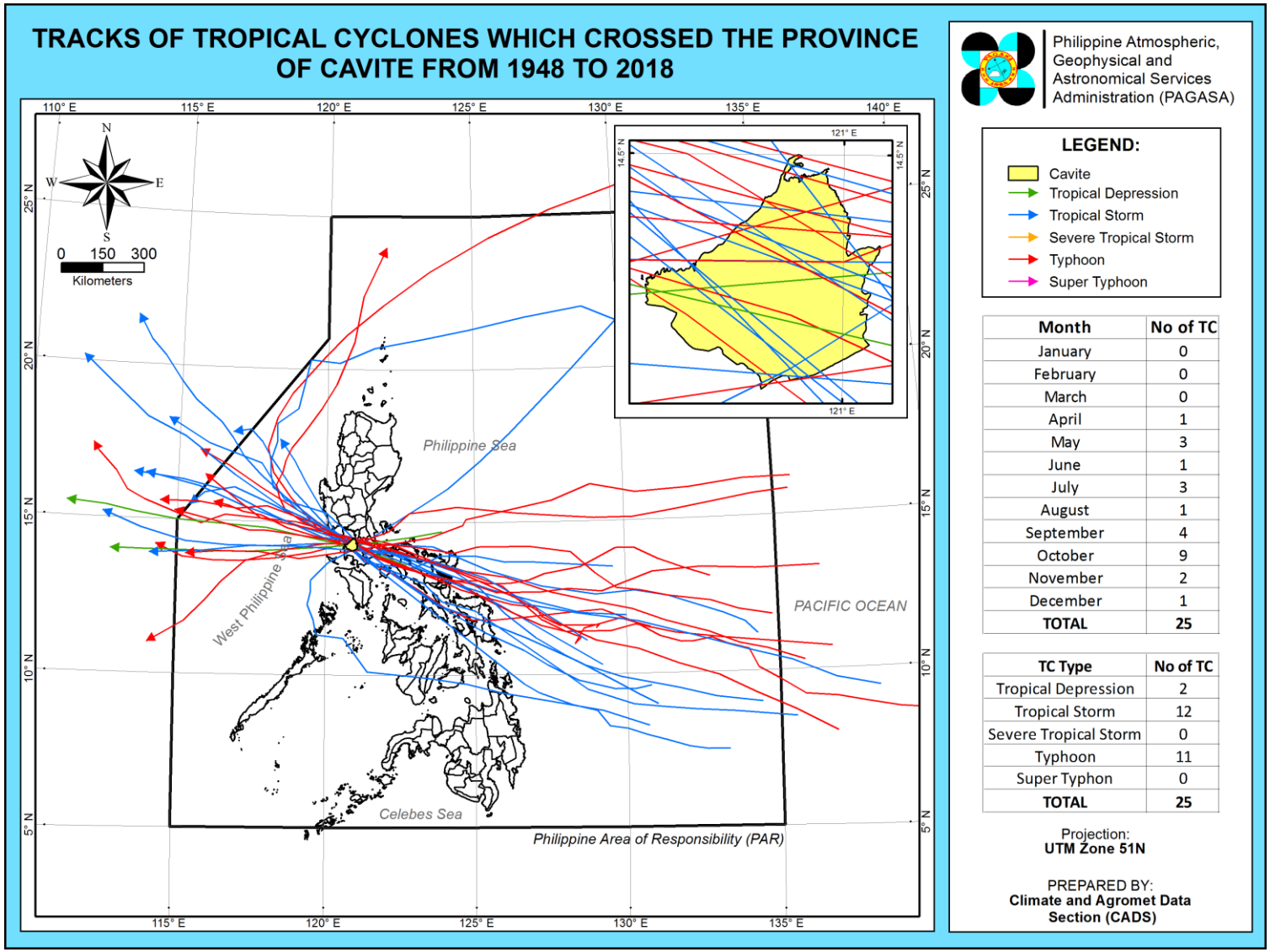


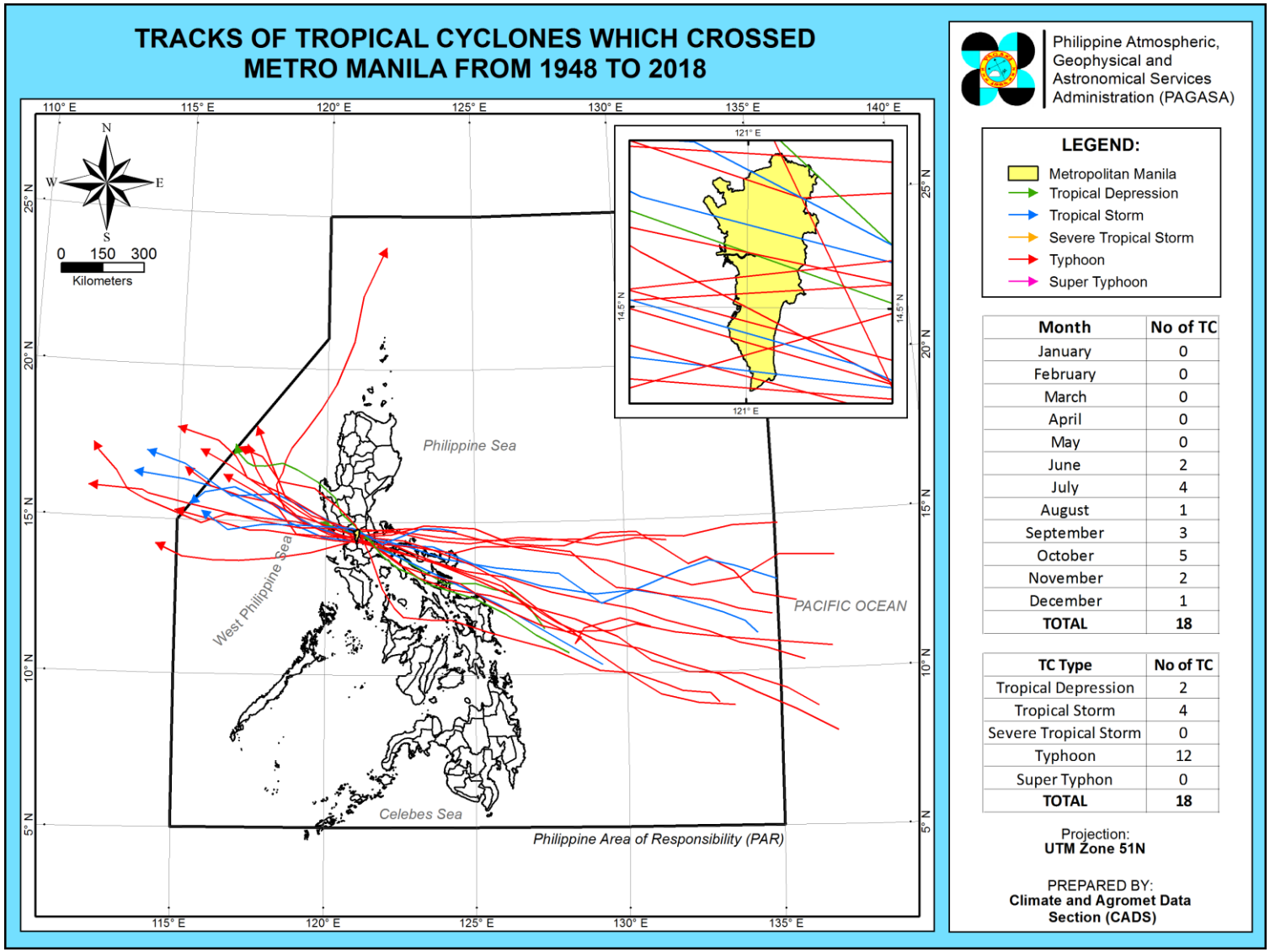
Figure 3-37. Cyclone frequency map of the Philippines.



Month	No of TC
January	0
February	0
March	0
April	1
May	3
June	1
July	3
August	1
September	4
October	9
November	2
December	1
TOTAL	**25**

TC Type	No of TC
Tropical Depression	2
Tropical Storm	12
Severe Tropical Storm	0
Typhoon	11
Super Typhon	0
TOTAL	**25**

Figure 3-38. Tracks of tropical cyclones crossing Cavite from 1948 to 2018.



Month	No of TC
January	0
February	0
March	0
April	0
May	0
June	2
July	4
August	1
September	3
October	5
November	2
December	1
TOTAL	**18**

TC Type	No of TC
Tropical Depression	2
Tropical Storm	4
Severe Tropical Storm	0
Typhoon	12
Super Typhon	0
TOTAL	**18**

Figure 3-39. Tracks of tropical cyclones crossing Metro Manila from 1948 to 2018.

3.3.1.3 CO2Potential impacts and mitigating measures

3.3.1.3.1 Change in local micro-climate

The potential impacts of the project to the local meteorology were discussed in terms of the PAGASA climate change projections and potential greenhouse gas emissions. The mean PAGASA projections rainfall and temperature changes in NCR and Cavite under the medium-range scenario were used for the project alignment.

PAGASA climate projections

1. Surface temperatures

In general, the country since 1971 has experienced an increase in mean, maximum, and minimum temperatures by 0.14°C per decade (IPCC, 2007). Tibig (2004) and Manton et al. (2001) support this finding by showing departures from the annual mean, maximum, and minimum temperatures in recent years of 0.61°C, 0.34°C, and 0.89°C, respectively from the 1961–1990 normal values (ADB, 2009).

The PAGASA projections (the medium-range scenario) showed surface temperature increases in 2020 and 2050 from the observed baseline (**Figure 3-40**). With these projections, the site may experience projected mean surface temperatures of 28.31 to 37°C in 2020 and 2050 respectively (**Table 3-37**).

Table 3-37. Projected mean seasonal temperatures at the project alignment*

Quarter	Observed Baseline, °C (1971-2000)	Change in 2020, °C (2006-2035)	Change in 2050, °C (2036-2065)
DJF	25.90	26.90	27.90
MAM	28.50	29.65	30.65
JJA	27.65	28.55	29.45
SON	27.15	28.15	29.05
Annual mean	27.30	28.31	29.26

Source: derived from the report "Climate Change in the Philippines", PAGASA; *medium-range emission scenario projection; NOTES: DJF – Dec, Jan, Feb; MAM – Mar, Apr, May; JJA – Jun, Jul, Aug; SON- Sep, Oct, Nov

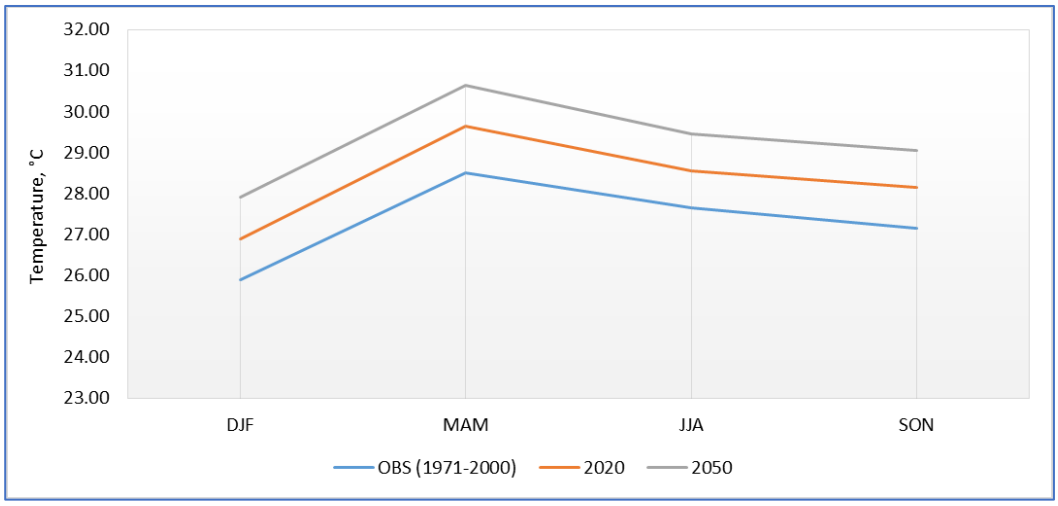


Figure 3-40. Projected mean quarterly surface temperatures at the project alignment.

2. Rainfall

In contrast to the projected temperature increase, the mean annual rainfall and the number of rainy days in the country has decreased since 1960. The country also experienced variability in the onset of the rainy season. The trend has been toward decreasing rainfall over Luzon and parts of Mindanao and increasing rainfall over the central western part of the country (Anglo, 2006).

The PAGASA predictions for the medium-range scenario showed both decreases and increases in rainfall from the observed baseline (**Figure 3-41**). The alignment may experience a decrease and increase in rainfall from

December to May in 2020 and 2050 (**Table 3-38**), experience the highest rainfall in June, July, and August (**Figure 3-41**) in 2020 and 2050 with an annual rainfall of 1,194 to 1,323 mm (**Table 3-39**).

Table 3-38. Projected mean seasonal rainfall changes at the project alignment*

Quarter	Change in 2020, %	Change in 2050, %
DJF	-19.45	-18.2
MAM	-30.75	-34.5
JJA	10.8	22.75
SON	0.2	4.8

Source: Climate Change in the Philippines, PAGASA; *medium-range emission scenario projection; NOTES: DJF – Dec, Jan, Feb; MAM – Mar, Apr, May; JJA – Jun, Jul, Aug; SON- Sep, Oct, Nov

Table 3-39. Mean rainfall projections at the project alignment*

Quarter	1971-2000	2020	2050
DJF	116.20	93.6	95.1
MAM	220.65	152.8	144.5
JJA	1077.95	1,194.4	1,323.2
SON	668.85	670.2	701.0
Annual total	2,083.7	2,111.0	2,263.7

Source: derived from the report "Climate Change in the Philippines", PAGASA; *medium-range emission scenario projection; NOTES: DJF – Dec, Jan, Feb; MAM – Mar, Apr, May; JJA – Jun, Jul, Aug; SON- Sep, Oct, Nov

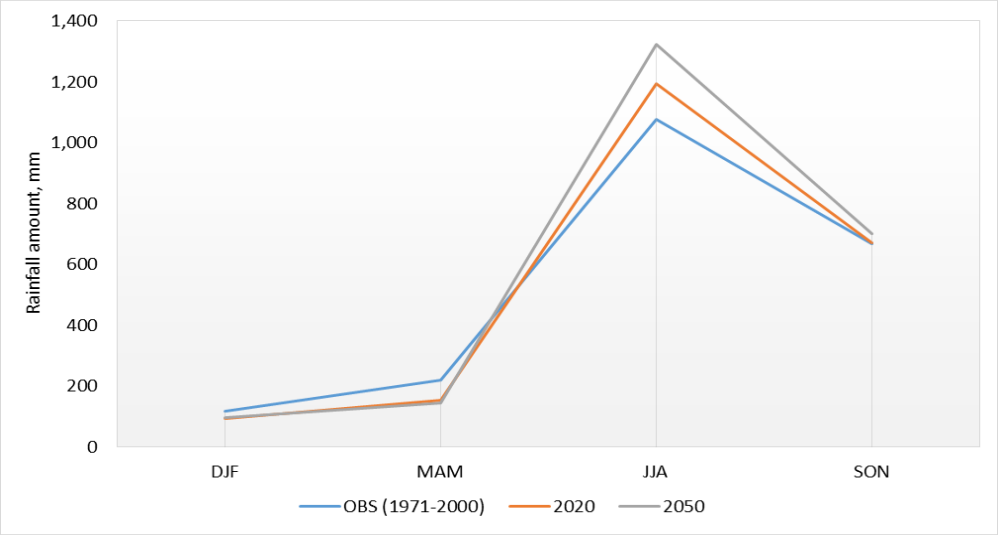


Figure 3-41. Projected quarterly rainfall at the project alignment.

3.3.1.3.2 Contribution in terms of greenhouse gas (GHG) emissions

Construction Phase

The GHG were estimated using available data at this stage. Available information are the length of each platform (110m) and the number of stations along the alignment. The number of platforms was estimated by dividing the length of each alignment by the platform length. All four alignments comprising the LRT6 have a total length of about 52 kilometers.

The initial estimate showed that a total GWP of 204,486 CO_2-eq during the construction of the entire LRT6 alignment (green cell in **Table 3-41**) with the Line 6A having the highest GWP. The annualized GWP over the entire 5-year construction period (2019 - 2024) is 40,897 CO_2-eq.

Table 3-40. LRT6 configuration data

Parameter	Unit	Alignment			
		Line 6A	Line 6B	Line 6C	LRT6
Length	km	26.71	12.7	7.65	4.94
# Platforms	num	243	115	70	45
# Stations	num	9	7	5	3

Table 3-41. GHG emissions and GWP for LRT6 during construction

Greenhouse gas	Unit	Line 6A	Line 6B	Line 6C	LRT6
CO_2	CO_2-eq	83,174	53,562	36,432	22,310
CH_4	CO_2-eq	75	49	33	20
N_2O	CO_2-eq	7	4	3	2
GWP	CO_2-eq	87,011	56,028	38,109	23,338
TOTAL (all alignments)					
CO_2	CO_2-eq	195,478			
CH_4	CO_2-eq	177			
N_2O	CO_2-eq	15			
GWP	CO_2-eq	204,486			

Line 6A - Niog-Gov's Drive (Cavite Line); Line 6B - Sucat-Govs Drive; Line 6C - Sucat-Lakefront; LRT6 - Zapote-Alabang

Operation Phase

The project is not seen to have significant direct GHG emissions during the operation phase. The mass electric rail transport will reduce the use of motor vehicles in the long term translating to a reduction of GHG emissions.

3.3.2 Air Quality and Noise

This section presents the existing ambient air quality and sound profile at the vicinities of the alignment and potential impacts during construction and operation phases. Long-term gaseous emissions are not expected due to the nature of the project. Fugitive particulate emissions and noise during the construction and operation phases are the potential impacts. The applicable standards for describing the existing air quality and sound profile and potential impacts are shown in **Table 3-42**, **Table 3-43**, and **Table 3-44**.

Table 3-42. Applicable ambient air quality guideline values

Pollutant	AT	Unit	Value	Source
TSP	24h	µg/ncm	230	CAA NAAQGV
NO_2	24h	µg/ncm	150	CAA NAAQGV
SO_2	24h	µg/ncm	180	CAA NAAQGV

Source: Implementing Rules and Regulations of the Clean Air Act AT – averaging time; CAA – Clean Air Act; NAAQSSSAPIS/O - National Ambient Air Quality Standards for Source Specific Air Pollutants from Industrial Sources/Operations; NAAQGV - National Ambient Air Quality Guideline Values

Table 3-43. Environmental quality standards for noise in general areas, dB(a)

Category	Daytime	Morning/Evening	Nighttime
AA	50	45	40
A	55	50	45
B	65	60	55
C	70	65	60
D	75	70	65

NOTE: Morning: 5am-9am; Daytime: 9am-6pm; Evening: 6pm-10pm; Night-time 10pm-5am

Category description:

AA	100 m from schools, nurseries, hospitals, home of the aged
A	residential area
B	commercial area
C	light industrial area
D	heavy industrial area

Table 3-44. Maximum noise levels allowed during construction[13]

Class	Construction activities	Limit, dBA
1	Pile drivers (excluding manual type), riveting hammers or combination thereof. Does not include pile drivers used in combination with earth augers.	90
2	Rock drills, or similar equipment like jackhammers or pavement breakers	85
3	Air compressors (limited to compressors which use power other than electric motors with a rated output of 15kW or more). Air compressors power rock drills, jackhammers, and pavement breakers are excluded.	75
4	Batching plant operation (limited to those with mixer capacities of 200kg or more. Batching plants for mortar-making are excluded.	75

NOTE: No construction in Class AA, A, B areas (except during emergencies, calamities, disasters) from 7 pm to 7 am for Class 1&2 construction activities and from 9 pm to 7 am for Class 3&4 construction activities

3.3.2.1 Methodology

Existing conditions

The existing ambient air quality and sonic profile were described by measuring the ambient levels of the criteria pollutants (TSP, SO_2, NO_2) and sound levels at selected locations along the project alignment (**Figure 3-42** and **Table 3-45**). Methods for sampling and analysis conformed to methods prescribed in Sec. 1(b) Rule VII Part II of the Clean Air Act IRR. The resulting ambient air concentrations were compared with the National Ambient Air Quality Guidelines Values (NAAQGV), Rule VII, Part II for the indicative air quality.

Table 3-45. Description of the ambient air sampling stations

Station ID	Description	Coordinates	
		Latitude	Longitude
AQ1	Olivarez College & Hospital	14°28'47.94"N	120°59'50.21"E
AQ2	Sucat Interchange	14°27'15.39"N	121° 2'40.01"E
AQ3	Alabang Medical Center	14°25'51.59"N	121° 0'53.76"E
AQ4	Madrigal Business Park	14°25'34.37"N	121° 1'38.51"E
AQ5	St. Dominic College & Hospital	14°27'32.24"N	120°57'36.34"E
AQ6	South East Asian Medical Center	14°24'20.92"N	120°58'38.83"E
AQ7	Avida Residences	14°19'58.24"N	120°59'14.02"E
AQ8	Paliparan Elementary School	14°18'10.13"N	120°59'33.38"E
AQ9	Jollibee Paliparan	14°19'13.81"N	120°59'5.58"E
MRT3(a)	MRT3/LRT1 Taft station	14°32'14.02"N	121° 0'1.49"E
MRT7(a)	Construction site at Greater Lagro, Quezon City	14°44'7.51"N	121° 4'5.61"E

(a) Sound measurements only

The existing sound profile at the alignment was determined by taking sound measurements for 24 hours in five-minute intervals at ambient air quality stations. The resulting records were processed to determine the noise descriptors defined in **Table 3-46**.

Table 3-46. Noise descriptors used in describing the existing sonic profile at the alignment.

Noise descriptor	Description
L_{10}	Sound level exceeded 10% of the time of the measurement period. For example, an L10 of 75 dBA means that over a period of one hour, the noise greater than 75dBA was recorded for six minutes or one minute over a period of 10 minutes.
L_{50}	Sound level exceeded 50% of the time. It is statistically the midpoint of the noise readings representing the median of the fluctuating noise levels.
L_{90}	Sound level exceeded 90% of the time representing the background levels
Lmax	Highest recorded sound level
Lmin	Lowest recorded sound level
Laeq	Equivalent continuous sound level; equivalent to the total sound energy measured over a stated period of time; also known as the time-average sound level.

[13] measured at 30m

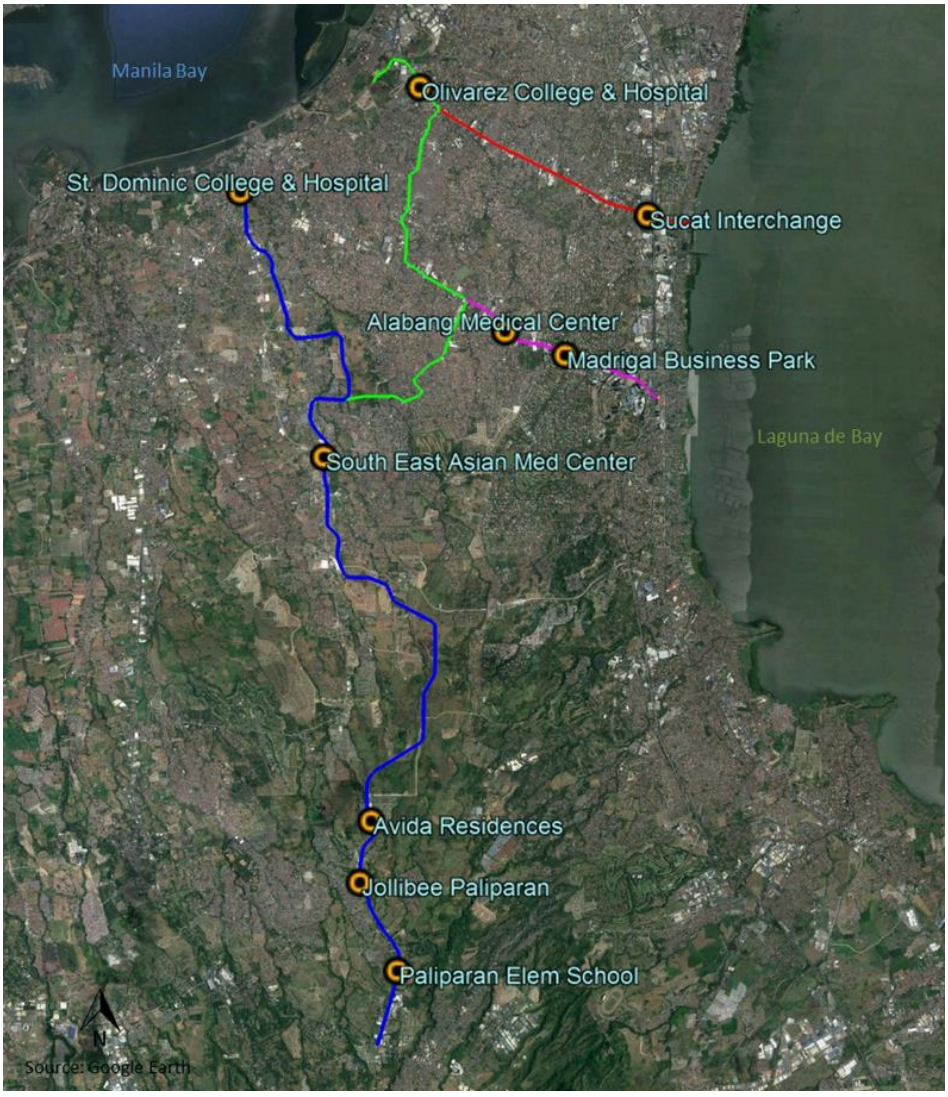


Figure 3-42. Ambient air sampling and sound level stations map

The reports for the ambient air quality sampling and sample sound level measurement data are shown in **Appendix 15** and **Appendix 16**, respectively.

Impact assessment

Due to unavailable information about the details of construction, the noise impact during the construction of the project alignment was assessed by deducing from sound measurements taken at a location where there is ongoing construction of an MRT 7 segment in Greater Lagro, Quezon City.

The noise impacts during operation of the project alignment were assessed by first predicting the sound levels using the CUSTIC noise model then determined the equivalent sound level (Leq) using the baseline sound measurement records. The CUSTIC V3.2 software is proprietary WINDOWS-based software that estimates the dispersion of sound in the atmosphere using classical sound propagation and the ISO 9813 methods. The noise impact was assessed by determining the change of the predicted sound levels from the baseline Leq. The predicted sound levels were also compared with the DENR Environmental Quality Standards for Noise in General Areas (**Table 3-47**).

Five domains were created for Line A, Line B, Line C, Zapote-Alabang line, and the entire alignment. The domain data and UTM coordinates are shown in **Table 3-47** and **Table 3-48**, respectively while **Figure 3-43** to **Figure 3-46** show the domains.

Table 3-47. Domain grid data for noise modeling

Parameter	All	Line A	Line B	Line C	Zapote-Alabang
xlen, m	14000	8500	7500	10000	8000
ylen, m	26000	23000	11600	8000	6000
Δx	100	100	100	100	100
Δy	100	100	100	100	100
#x-pt	141	86	76	101	81
#y-pt	261	231	117	81	61
#nodes	36801	19866	8892	8181	4941

Table 3-48. Point coordinates of noise model domains

	ALL		Line A		Line B		Line C		ZapAla	
Point	Ex	Ny	Ex	Ny	Ex	Ny	Ex	Ny	Ex	Ny
SW	278174	1578528	278423	1578408	279618	1592678	281845	1596586	283174	1592649
NE	292174	1604528	286923	1601408	287118	1604278	291845	1604586	291174	1598649
NW	278174	1604528	278423	1601408	279618	1604278	281845	1604586	283174	1598649
SE	292174	1578528	286923	1578408	287118	1592678	291845	1596586	291174	1592649

The model inputs and assumptions are enumerated below.

1. Operation time: 0500H-1200H (19 hours)
2. Total number of trains during operation
   - Cavite Line (Line A): 380 (20 trains/h – FS data)
   - Sucat Line (Line B, Line C, Zapote-Alabang): 285 (15 trains/h – FS data)
3. Derived coefficient of attenuation (atmospheric) = 0.477

   Data used:

   Temp = 25C (mean of Sangley & NAIA)

   Relative humidity = 85% (mean of Sangley & NAIA)

4. Final SPL was the average of predicted SPLs at ground- level, 5.33m, and 7.5m

Figure 3-43. Noise model domains for Lines A and B

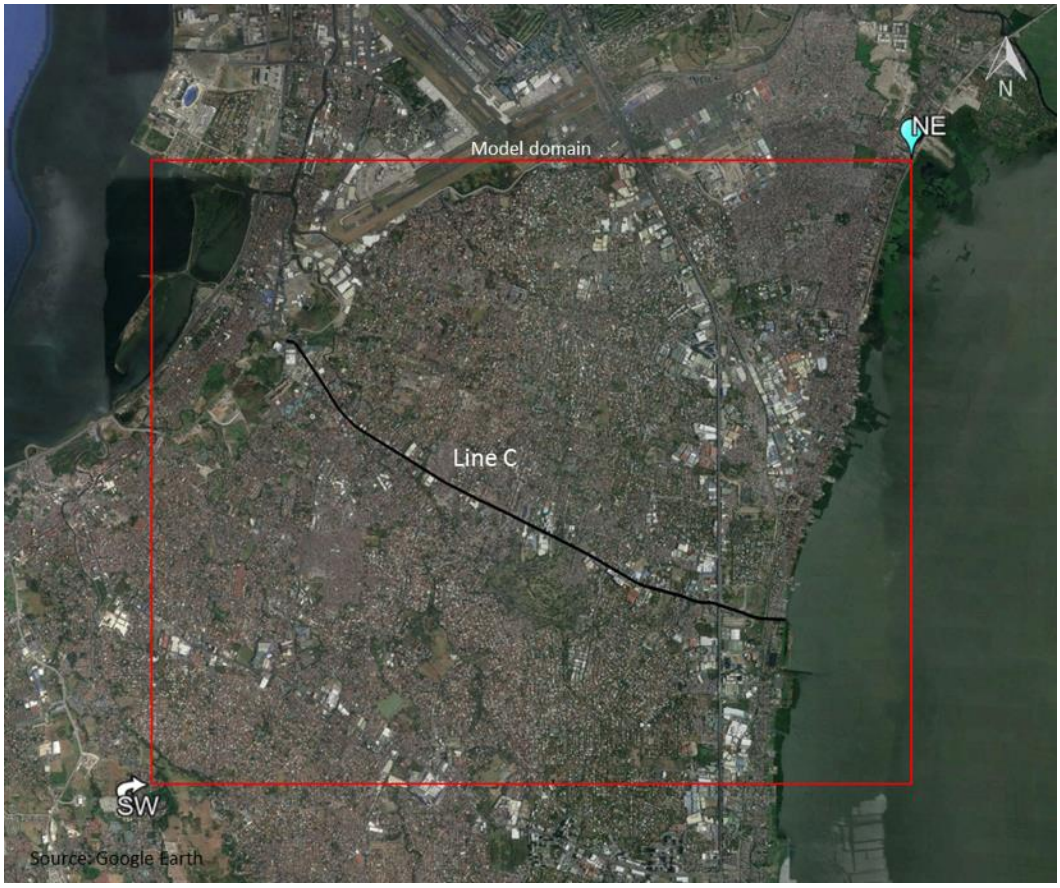


Figure 3-44. Noise model domain for Line C

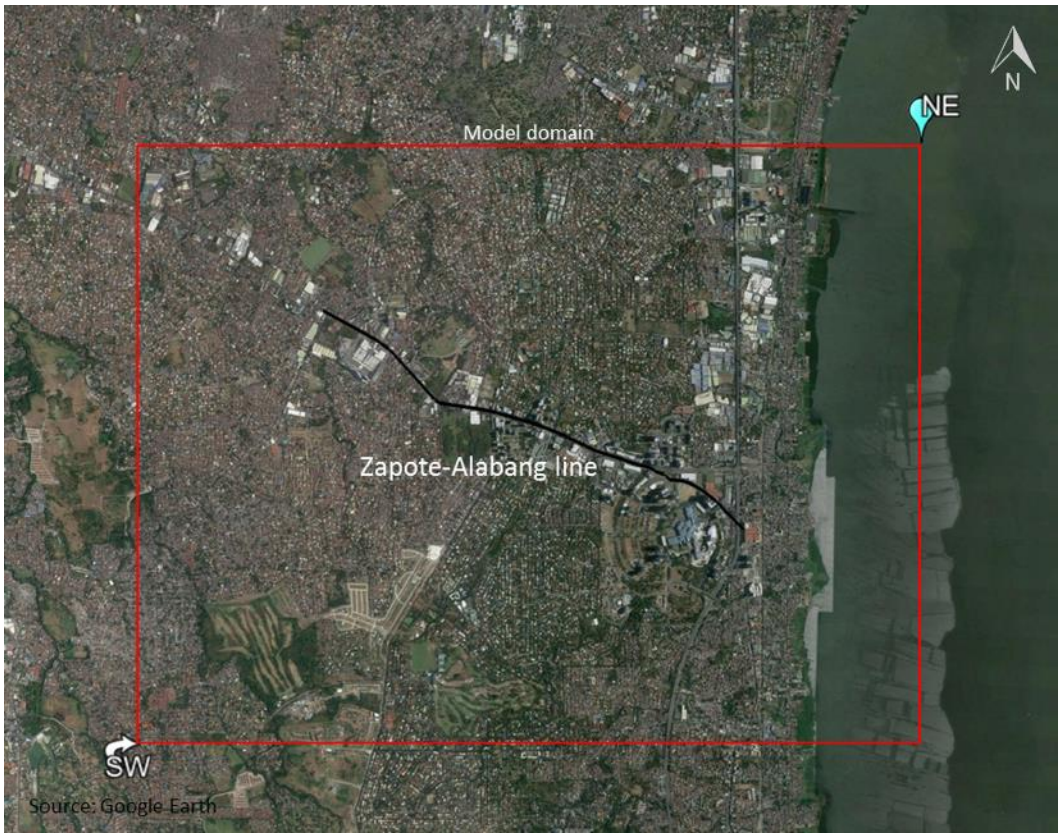


Figure 3-45. Noise model domain for the Zapote-Alabang line

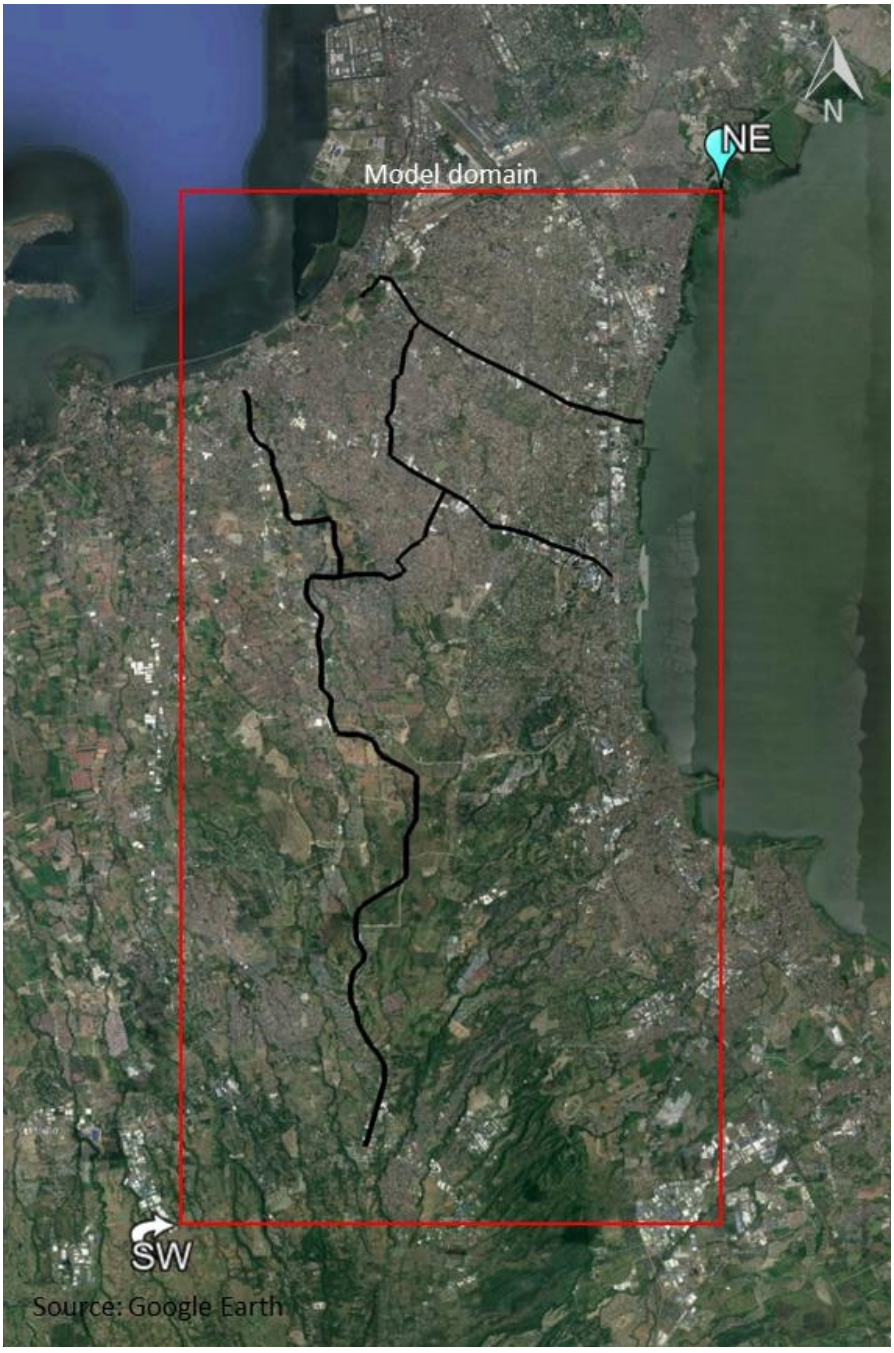


Figure 3-46. Noise model domain for the entire LRT6 alignment.

3.3.2.2 Existing Conditions

Ambient air quality

1. Source of air pollution

The major sources of air emissions that affect the overall ambient air quality along the alignments are motor vehicles and built-up areas. Major pollutants emitted are combustion gases (SO_2, NO_2, CO), and particulates (TSP and PM_{10}).

2. Air pollutant

The sampling showed that ambient air levels of all criteria pollutants at the 24h averaging time at the stations were less than their corresponding CAA guideline values (**Table 3-49**) with particulates having the highest measured

levels and exceeding the CAA guideline values in Station A9 (Jollibee Paliparan). This indicated that most of the air pollution sources in the vicinity of the stations emit particulates either from combustion or fugitive sources.

Table 3-49. Ambient concentrations of criteria pollutants (24-hr sampling).

Pollutant	AT	Unit	Station ID			CAA GV
			A1	A6	A9	
TSP	24h	ug/Ncm	83.7	73.5	71.6	230
PM_{10}	24h	ug/Ncm	62.4	28.1	179.8	150
$PM_{2.5}$	24h	ug/Ncm	8.5	13.9	70.8	50*
SO2	24h	ug/Ncm	ND	ND	ND	180
NO2	24h	ug/Ncm	15.2	9.7	33.2	150

AT – averaging time; CAA GV – Clean Air Act Guideline Value; ND – Not Detected or Below the Method Detection Limit

1-hr ambient air concentrations were also recorded in selected stations along the project alignments. Results shown in **Table 3-50** below indicate that the values are within the CAA guideline values for criteria pollutants.

Table 3-50. One-hour ambient air concentrations of criteria pollutants (April 2019)

Station	Location	AT	Unit	Pollutant				
				TSP	PM_{10}	$PM_{2.5}$	NO_2	SO_2
A2	Sucat Interchange	1h	ug/Ncm	16.9	9.3	4.9	ND	ND
A3	Alabang Medical Center	1h	ug/Ncm	38.5	22.5	17.3	14.9	ND
A4	Madrigal Business Park	1h	ug/Ncm	47.2	28.1	16.5	ND	ND
A5	St. Dominic College and Hospital	1h	ug/Ncm	44.6	17.3	10.6	ND	ND
A7	Armstrong Village	1h	ug/Ncm	66.9	33.5	17.4	ND	ND
A8	Paliparan Elementary School	1h	ug/Ncm	65.4	19.5	16.7	17.0	ND
CAA GV		1h	ug/Ncm	300	200	50*	260	340

AT – averaging time; CAA GV – Clean Air Act Guideline Value; ND – Not Detected or Below the Method Detection Limit

Sound levels

The noise descriptors derived from the 24-hour records are shown in **Table 3-51** and **Table 3-52** for Categories A (residential area) and B (commercial area) respectively. The general category at the sound measurement stations was assumed to be either residential or commercial because of the mixed-use nature of the areas where the project alignment traverses.

The records showed that the lowest and peak sound levels across stations and time frames are 35 and 98 decibels respectively. The lowest and peak sound levels were recorded during daytime at the MRT 7 construction site and MRT3/LRT1 station respectively.

Similarly, the 24-hour equivalent continuous sound level (Laeq) ranged from 63 to 89 at all stations and time frames. The Laeq is a single value representing the average of sound levels that vary over time. Sound levels often fluctuate over a wide range with time (as shown by the wide range of the lowest and peak sound level recorded). An example is the low sound levels at night-time (as low as 30 dBA) with occasional passing vehicles of 70 dBA or more followed by the general sound generated during the day before relative peace returns in the late evening.

In general, the background sound levels across stations and timeframes ranged from 61 (Stations MRT3/LRT1 Taft) to 78 decibels in Station A6 (Southeast Asian Medical Center). The ranges represented sound levels from normal activities, i.e., activities done at a regular and relatively constant pace at the vicinities of the stations.

Except at Station A6 (Southeast Asian Medical Center) during daytime, all background sound levels (L90) exceeded the DENR standards across stations and time frames (green cells in **Table 3-46** and **Table 3-47**). The exceedances ranged from one to 27 decibels. The L90 considered as the ambient level of the sound environment is the accumulation of sound generated from various sources or activities within the vicinity.

Table 3-51. Noise descriptors and impact at existing conditions for Category A (residential area)

Station	Location	Category	Timeframe	Noise descriptor, dBA						DENR	Impact		
				Lmin	L90	L50	L10	Lmax	Laeq		L90	Lmax	Laeq
MRT3	MRT 3 / LRT 1 Taft Station	A	Morning	71	75	79	81	90	80	50	-25	-40	-30
		A	Daytime	76	78	82	92	98	89	55	-23	-43	-34
		A	Evening	72	77	86	91	96	88	50	-27	-46	-38
		A	Night time	70	72	76	80	90	78	45	-27	-45	-33
MRT7	MRT 7 Construction at Lagro Area	A	Morning	64	70	76	88	96	85	50	-20	-46	-35
		A	Daytime	35	70	75	85	93	80	55	-15	-38	-25
		A	Evening	68	69	75	86	96	83	50	-19	-46	-33
		A	Night time	63	69	73	80	87	76	45	-24	-42	-31
A1	Front of Olivares College and Hospital	A	Morning	69	70	74	82	86	78	50	-20	-36	-28
		A	Daytime	63	69	73	81	91	78	55	-14	-36	-23
		A	Evening	65	69	73	79	87	77	50	-19	-37	-27
		A	Night time	56	69	72	77	87	75	45	-24	-42	-30
A6	Front of Southeast Asian Medical Center	A	Morning	62	64	65	67	67	65	50	-14	-17	-15
		A	Daytime	62	63	65	67	95	75	55	-8	-40	-20
		A	Evening	62	62	65	67	69	65	50	-12	-19	-15
		A	Night time	54	61	62	65	69	63	45	-16	-24	-18
A9	Left Side of Jollibee Paliparan	A	Morning	62	66	70	77	87	74	50	-16	-37	-24
		A	Daytime	62	66	74	80	81	76	55	-11	-26	-21
		A	Evening	62	65	72	75	77	72	50	-15	-27	-22
		A	Night time	60	62	65	67	70	65	45	-17	-25	-20

Table 3-52. Noise descriptors and impact at existing conditions for Category B (commercial area)

Station	Location	Category	Timeframe	Noise descriptor, dBA						DENR	Impact		
				Lmin	L90	L50	L10	Lmax	Laeq		L90	Lmax	Laeq
MRT3	MRT 3 / LRT 1 Taft Station	B	Morning	71	75	79	81	90	80	60	-15	-30	-20
		B	Daytime	76	78	82	92	98	89	65	-13	-33	-24
		B	Evening	72	77	86	91	96	88	60	-17	-36	-28
		B	Night time	70	72	76	80	90	78	55	-17	-35	-23
MRT7	MRT 7 Construction at Lagro Area	B	Morning	64	70	76	88	96	85	60	-10	-36	-25
		B	Daytime	35	70	75	85	93	80	65	-5	-28	-15
		B	Evening	68	69	75	86	96	83	60	-9	-36	-23
		B	Night time	63	69	73	80	87	76	55	-14	-32	-21
A5	Front of Olivarez College and Hospital	B	Morning	69	70	74	82	86	78	60	-10	-26	-18
		B	Daytime	63	69	73	81	91	78	65	-4	-26	-13
		B	Evening	65	69	73	79	87	77	60	-9	-27	-17
		B	Night time	56	69	72	77	87	75	55	-14	-32	-20
A6	Front of Southeast Asian Medical Center	B	Morning	62	64	65	67	67	65	60	-4	-7	-5
		B	Daytime	62	63	65	67	95	75	65	2	-30	-10
		B	Evening	62	62	65	67	69	65	60	-2	-9	-5
		B	Night time	54	61	62	65	69	63	55	-6	-14	-8
A9	Left Side of Jollibee Paliparan	B	Morning	62	66	70	77	87	74	60	-6	-27	-14
		B	Daytime	62	66	74	80	81	76	65	-1	-16	-11
		B	Evening	62	65	72	75	77	72	60	-5	-17	-12
		B	Night time	60	62	65	67	70	65	55	-7	-15	-10

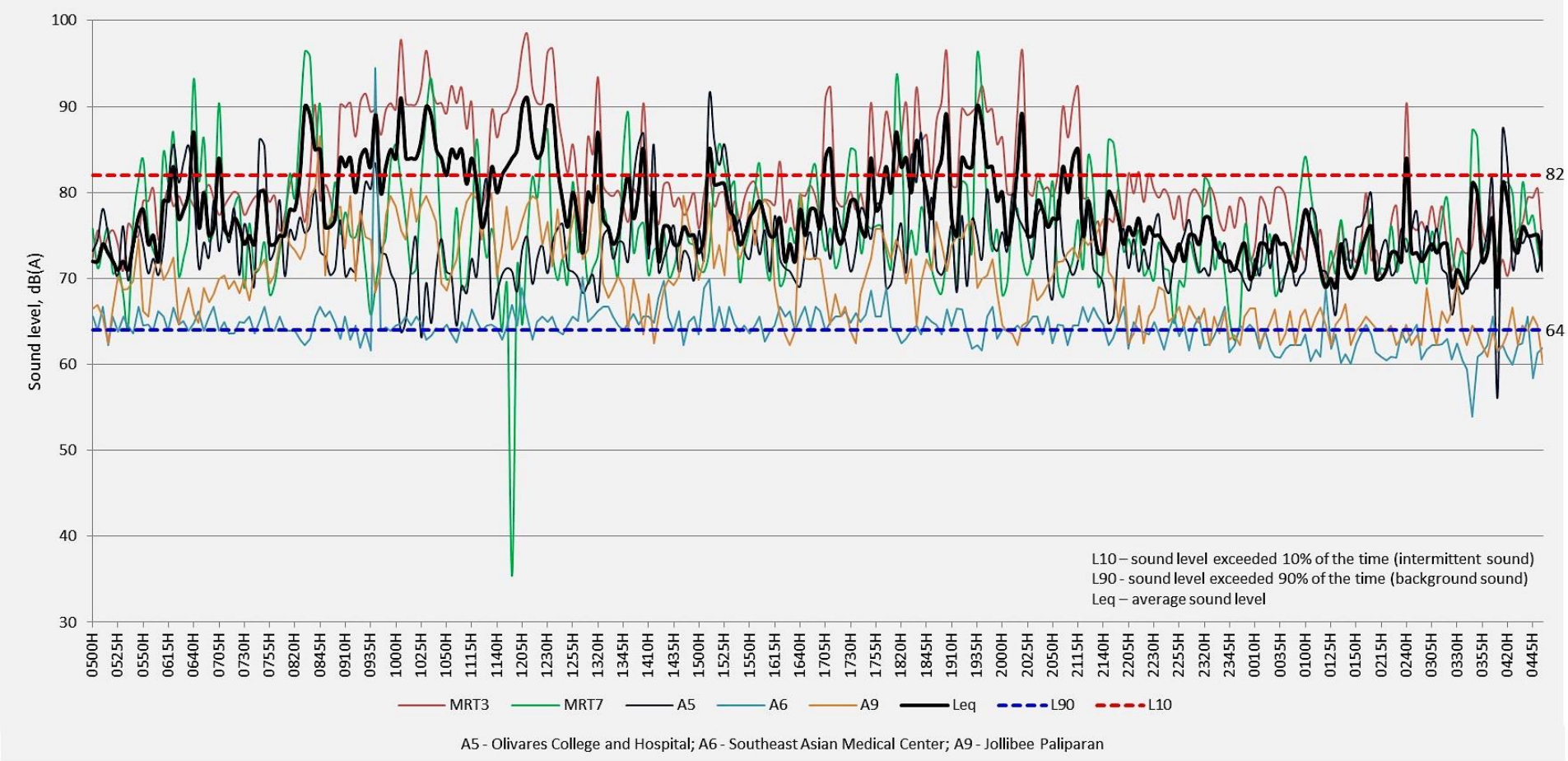


Figure 3-47. Diurnal pattern of existing sound levels and noise descriptors at the stations

Consequently, being the L90 is the "normal" sound level, exceedances on this level resulted to noise impacts based on the average (Leq) and maximum (Lmax) descriptors (gray cells in **Table 3-51** and **Table 3-52**). The ranges of the noise impacts at the residential and commercial areas across timeframes were five to 38 decibels and seven to 46 for the Leq and Lmax respectively. The mixed-use nature of the areas is demonstrated by the noise impacts at Stations A5 (Olivarez College and Hospital) and A6 (Southeast Asian Medical Center). In addition, the highest and lowest noise impacts were at Stations MRT3/LRT1 Taft and A6 (Southeast Asian Medical Center) respectively.

Figure 3-47 shows the 24-hr pattern of sound levels at the stations. The graph shows that most of the records exceeded the computed background sound level. The only station where some records were below the L90 was Station A6 (Southeast Asian Medical Center). The highest Laeq levels were recorded from 0800H to 1200H.

3.3.2.3 Potential ambient air impacts and mitigating measures

The construction of the project may have a potential impact on air quality especially on the residential areas on its eastern and western perimeter. However, these will be significantly mitigated by using dust suppression techniques such as water application and speed restriction. Water application (3.2h intervals) and speed restriction at active construction sites can reduce fugitive particulates generation by 61% and 57% respectively[14].

Significant air pollution impact during the operation phase is not expected due to the nature of the light rail project.

3.3.2.4 Potential noise impacts and mitigating measures

Construction phase

Construction equipment emits different sound levels that may result in noise impacts. The degree of disturbance will depend on the distance of the source to the receptor, nature of the activity, schedule and duration of activity and type of equipment used. The USEPA defines noise as any sound that is undesirable because it interferes with speech and hearing, and is intense enough to damage hearing, or is otherwise annoying.

In the absence of the equipment schedule at this time, typical equipment used during construction was used to predict the sound generated at different distances using the point source attenuation rate for geometric spreading (referred to as the inverse square law), represented by the formula

$$\Delta D = 10 \log \left(\frac{d_1}{d_2} \right)^2$$

where d_1 and d_2 are the distances and ΔD is the decibel difference.

Table 3-53 shows the sound levels of different construction equipment at 15 meters and the predicted levels at selected distances using the inverse square law.

[14] WRAP Fugitive Dust Handbook, 2006 (http://www.wrapair.org)

Table 3-53. Predicted sound levels of construction equipment

Classification	Equipment	Noise range at 15m, dB(A)*	Predicted levels, dB(A)				
			30 m	60 m	120 m	240 m	960 m
Earth-moving	Cranes	70 - 94	64-88	58-82	52-76	46-70	34-58
	Backhoe	74 - 92	68-86	62-80	56-74	50-68	38-56
	Front loader	77 - 94	71-88	65-82	59-76	53-70	41-58
	Dozer	70 - 95	64-89	58-83	52-77	46-71	34-59
	Grader	72 - 92	66-86	60-80	54-74	48-68	42-62
	Scraper	76 - 98	70-92	64-86	58-80	52-74	40-62
	Truck	84 - 93	78-87	72-81	66-75	60-69	48-57
	Compactor	72 - 74	66-68	60-62	54-56	48-50	36-38
Materials handling	Concrete mixer	75 - 85	69-79	63-73	57-67	51-61	39-49
	Concrete pump	81 - 83	74-76	68-70	62-64	56-58	44-46
	Cranes, derrick	88 - 90	82-84	76-78	70-72	64-66	52-54
	Cranes, movable	75 - 85	69-79	63-73	57-67	51-61	39-49
Stationary	Pump	69 - 71	63-65	57-59	51-53	45-47	33-35
	Generator	73 - 83	67-77	61-71	55-65	49-59	37-47
	Compressor	70 - 93	64-87	58-81	52-75	46-69	34-57
Impact activities	Jackhammer	82 - 97	76-91	70-85	64-79	58-73	46-61
	Pile driver	97 - 105	91-99	85-93	79-87	73-81	61-69

*Canter, 1996

The combined sound levels of the all equipment for each construction activity in **Table 3-54** showed potential exceedances to the DENR construction limits (green cell in **Table 3-54**) for Classes 1 to 3 during the project construction.

Table 3-54. Sound level emissions for construction activities

Classification	Noise range dB(A)*	Predicted levels, dB(A)				
		30m	60m	120m	240m	960m
Earth-moving	84-103	78-97	72-91	66-85	60-79	48-67
Materials handling	89-90	83-84	77-78	71-72	65-66	53-54
Stationary	75-93	69-87	63-81	57-75	51-69	39-57
Impact activities	97-106	91-100	85-94	79-88	73-82	61-70

*at 15 m

Processing of the sound records from a construction site of an MRT 7 segment in Greater Lagro, Quezon City showed a background and a 24h equivalent continuous sound level of 69 and 82 decibels respectively. About 94% of the 5-minute sound records exceeded the background sound level at the construction site. Intermittent high exceedances to the 24h equivalent continuous sound level were mostly recorded from 0600H to 0700H, 0830H to 0900H, 1000H, 1830H, and 2000H (**Figure 3-48**). These exceedances may be caused by a sound source other than construction activities, e.g., motor vehicles, honking horn, at the site. The 24h equivalent continuous sound level, however was less than the Classes 1 and 2 construction activities

Noise impacts deduced from sound records at the MRT 7 construction site showed low instances of exceedances to Classes 1 (3%) and 2 (9%) construction activities (**Figure 3-49**). This implies that activities defined by Classes 1 and 2 (see **Table 3-44**) were not being undertaken at the site and confirmed by observations during the sound measurements (passing vehicles like buses, trucks, jeepneys, were the sound generators most of the time – refer to **Appendix 16**).

It is more or less expected that the same conditions will apply during the construction of the project because the alignment is on and follows existing roads. Noise impacts during Class 1 and 2 activities are expected to be short and will cease once the infrastructures are erected. Subsequent sources of noise impacts will be motor vehicles.

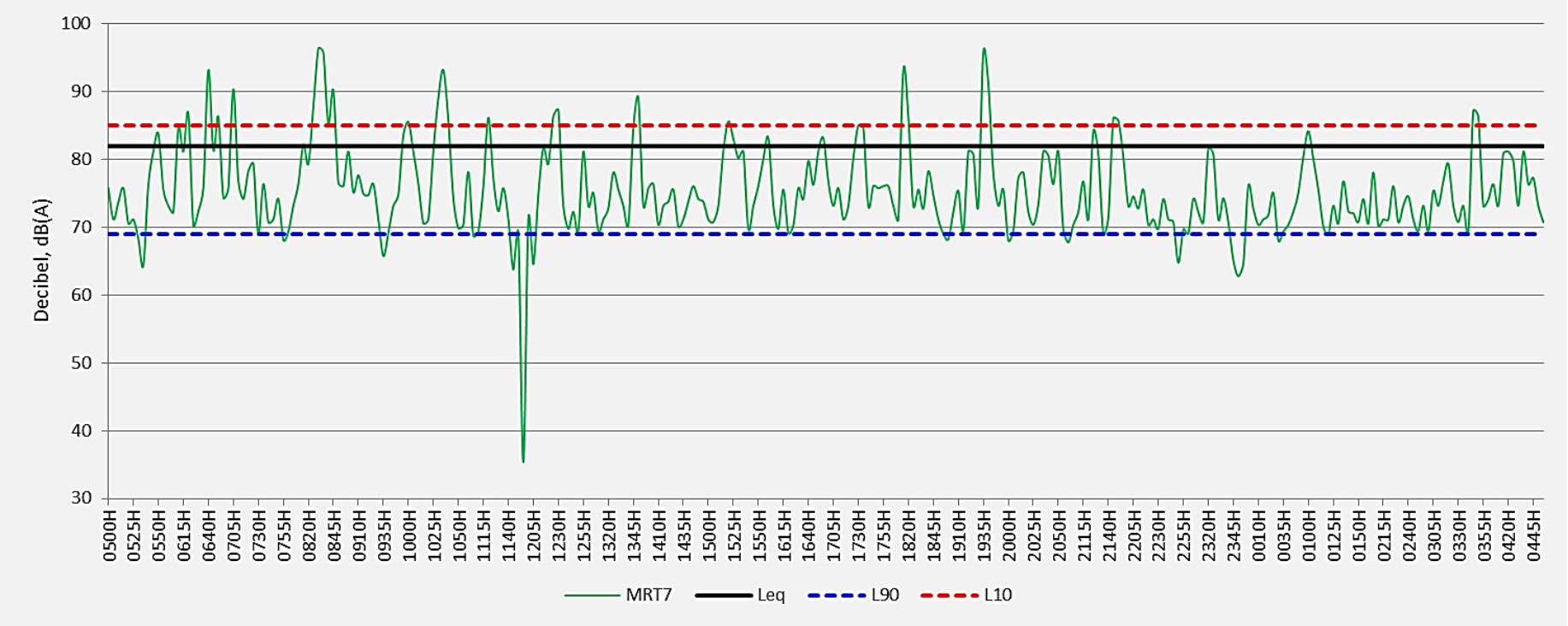


Figure 3-48. Diurnal pattern of sound levels and noise descriptors during the construction of MRT 7

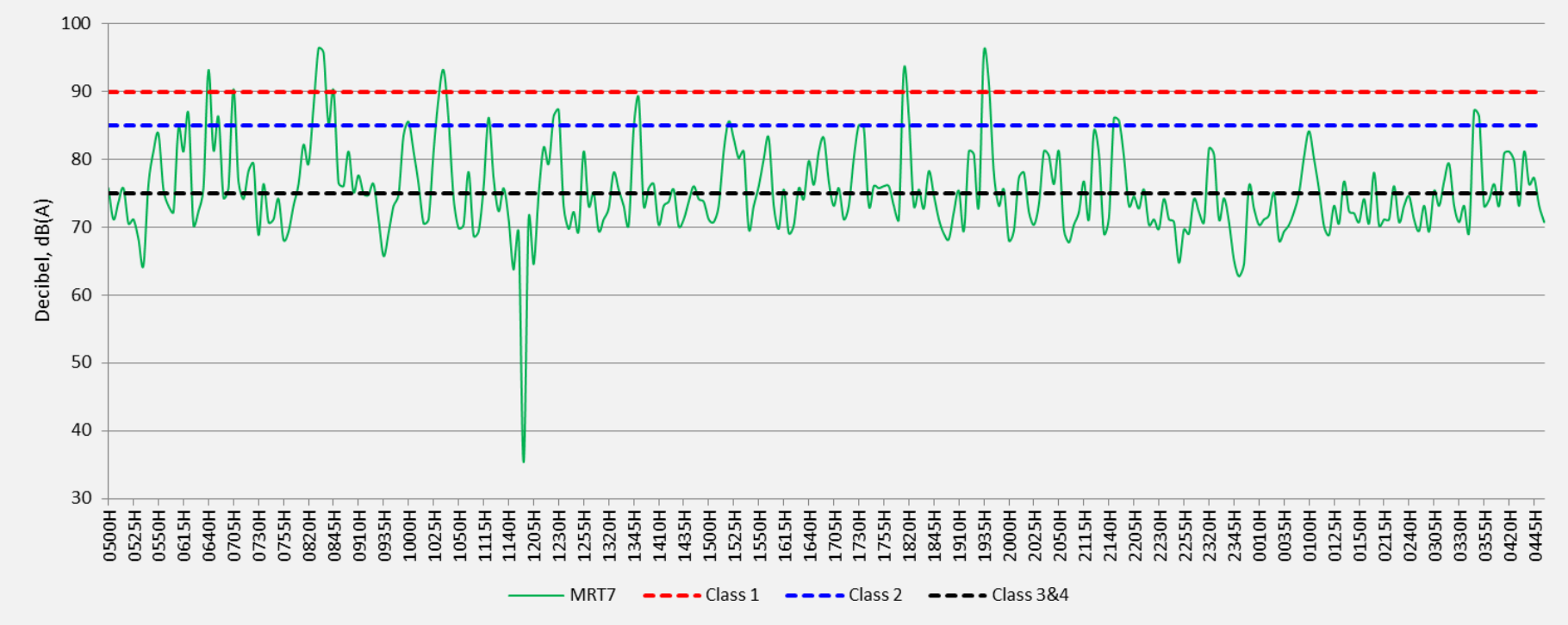


Figure 3-49. Noise impact during construction of MRT 7

Operation phase

Noise descriptors derived from sound records obtained at the MRT3/LRT1 station in Taft Avenue showed high background sound levels with a range of 72 to 76 decibels during operations. The peak (Lmax) sound levels ranged from 90 to 98 with a 24h average of 78 to 89 decibels. High sound levels were recorded around 9:30am to 11:00am, 12 noon to 1:00pm, and 7:00pm to 9:00pm (**Figure 3-50**). Comparing the 24hr records with the DENR EQSN for residential and commercial areas showed exceedances even during hours when trains are not operating, i.e., 12 midnight to around 0500H (**Figure 3-51**). This showed that there were other sound generators, e.g., motor vehicles, causing the exceedances.

The simulations showed that the maximum predicted sound level for the individual lines and entire project alignment ranged from 81 to 82 decibels. Similar to the sound records obtained from the MRT3/LRT 1 station, direct comparison of the predicted sound levels with the DENR EQSN for residential and commercial areas resulted in exceedances across time frames. The results can be considered as worst-case because only atmospheric attenuation was considered. The actual sound levels are expected to be lower from attenuation due to alignment barriers, ground effects, and other structures along the projected railway. The isopleths of the predicted sound levels during the operation phase are shown in **Figure 3-52** to **Figure 3-57**.

The noise impact (change from the baseline) was determined by subtracting predicted sound levels from the cumulative sound levels (sum of Laeq of sound records from the stations and predicted sound levels). The minimum and maximum cumulative sound levels during the operation for individual lines and the entire project alignment were almost equal with worst-case noise impacts less than half of a decibel (**Table 3-55**). Noise impacts are not expected and contribute to the existing sonic profile along the alignment negligible during operation due to barriers and the high background sound levels. The isopleths of the noise impacts are shown in **Figure 3-52** to **Figure 3-57**.

Table 3-55. Cumulative sound levels and noise impacts during operation phase

Alignment	Parameter	Min	Max
Line A	Cumulative sound	72.27663	72.4875
	Impact		-0.21087
Line B	Cumulative sound	71.11304	71.41843
	Impact		-0.30539
Line C	Cumulative sound	72.70131	72.9815
	Impact		-0.2802
Zapote-Alabang	Cumulative sound	75.65749	75.85711
	Impact		-0.19961
All	Cumulative sound	72.49726	72.67413
	Impact		-0.17687

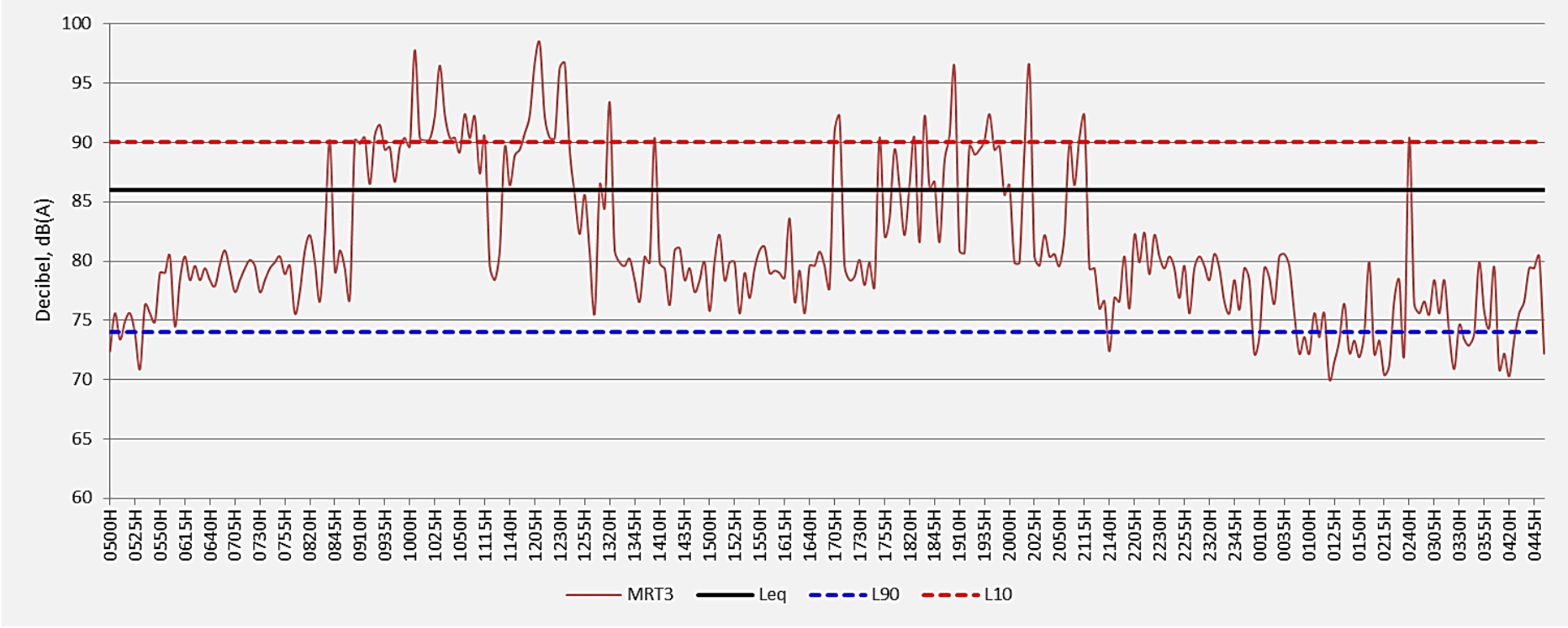


Figure 3-50. Diurnal pattern of sound levels and noise descriptors during the operation of MRT3

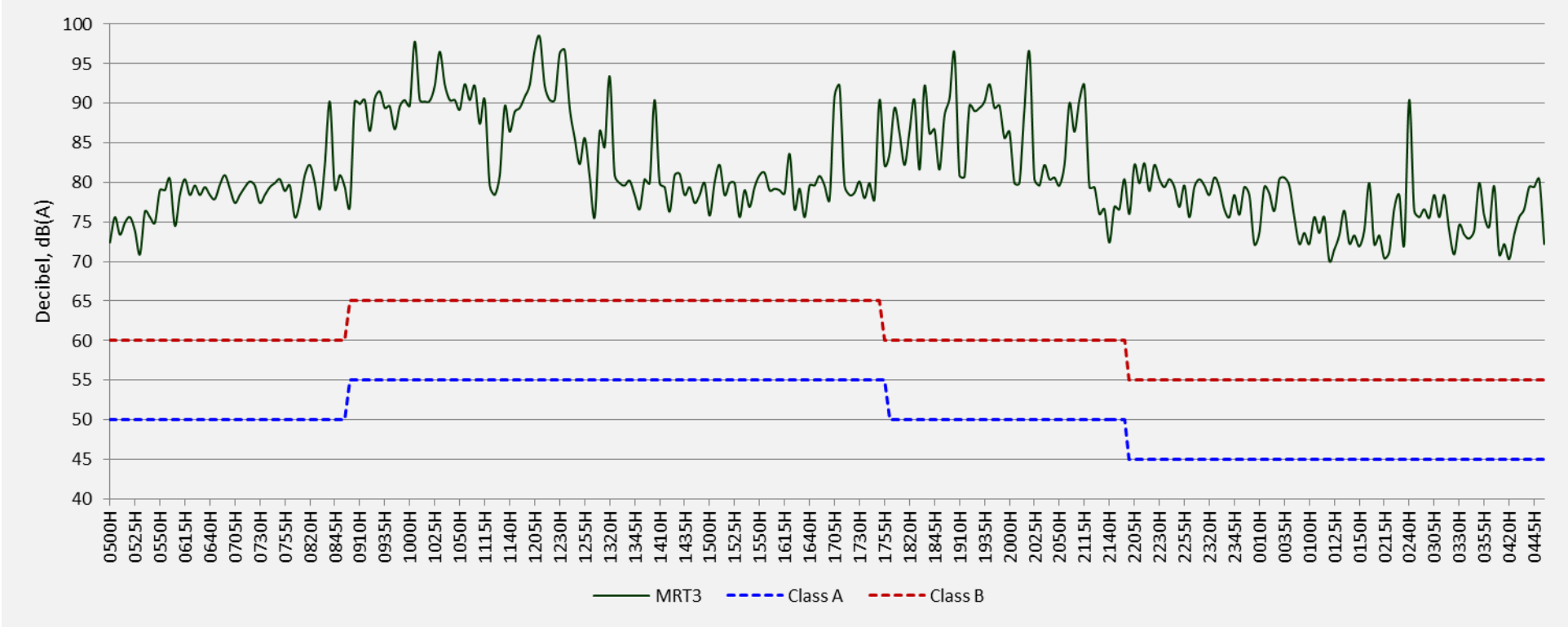


Figure 3-51. Existing sound levels and DENR EQSN during operation of the MRT3/LRT1

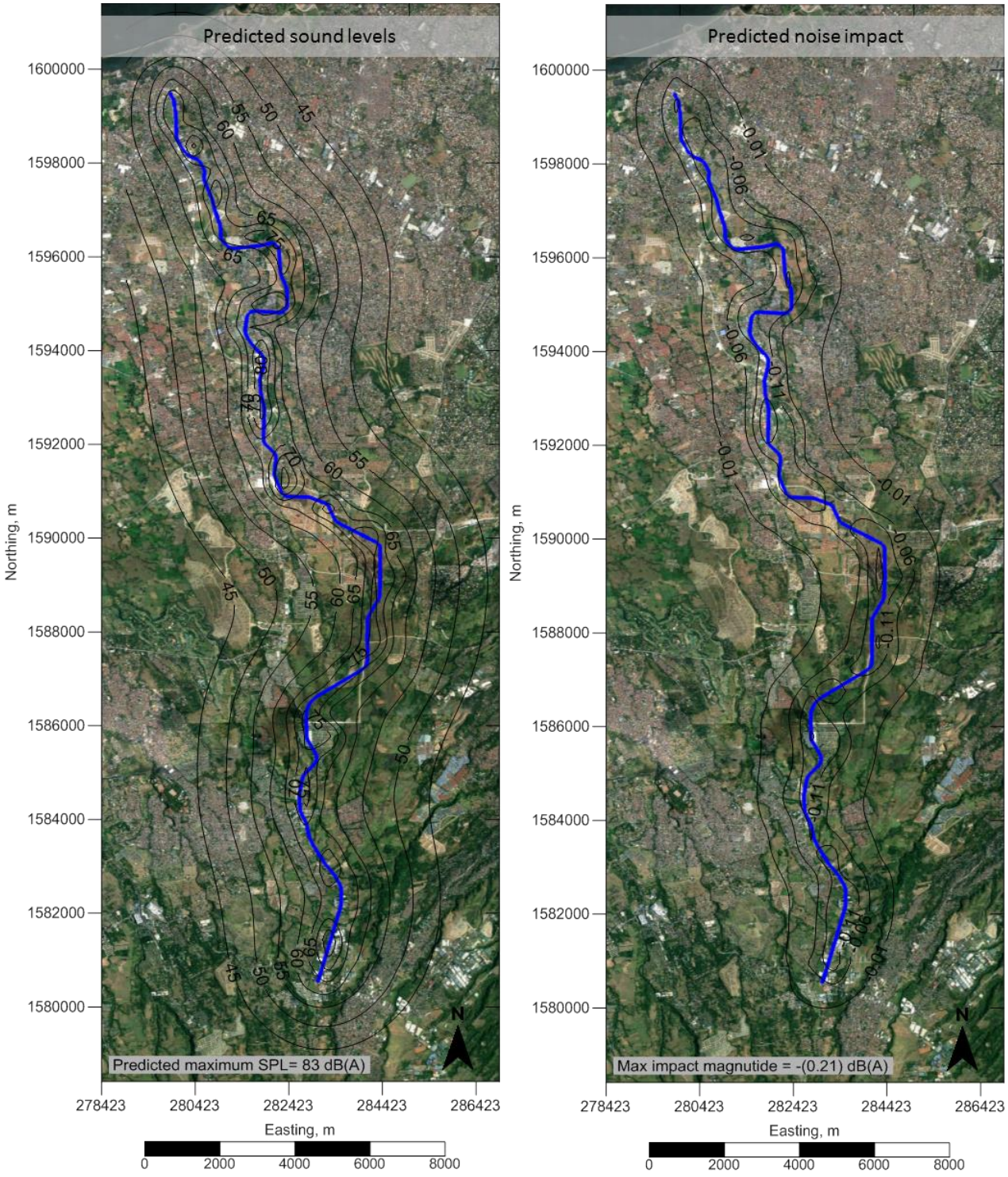


Figure 3-52. Isopleths of predicted sound levels and noise impact for the LRT6 Line A

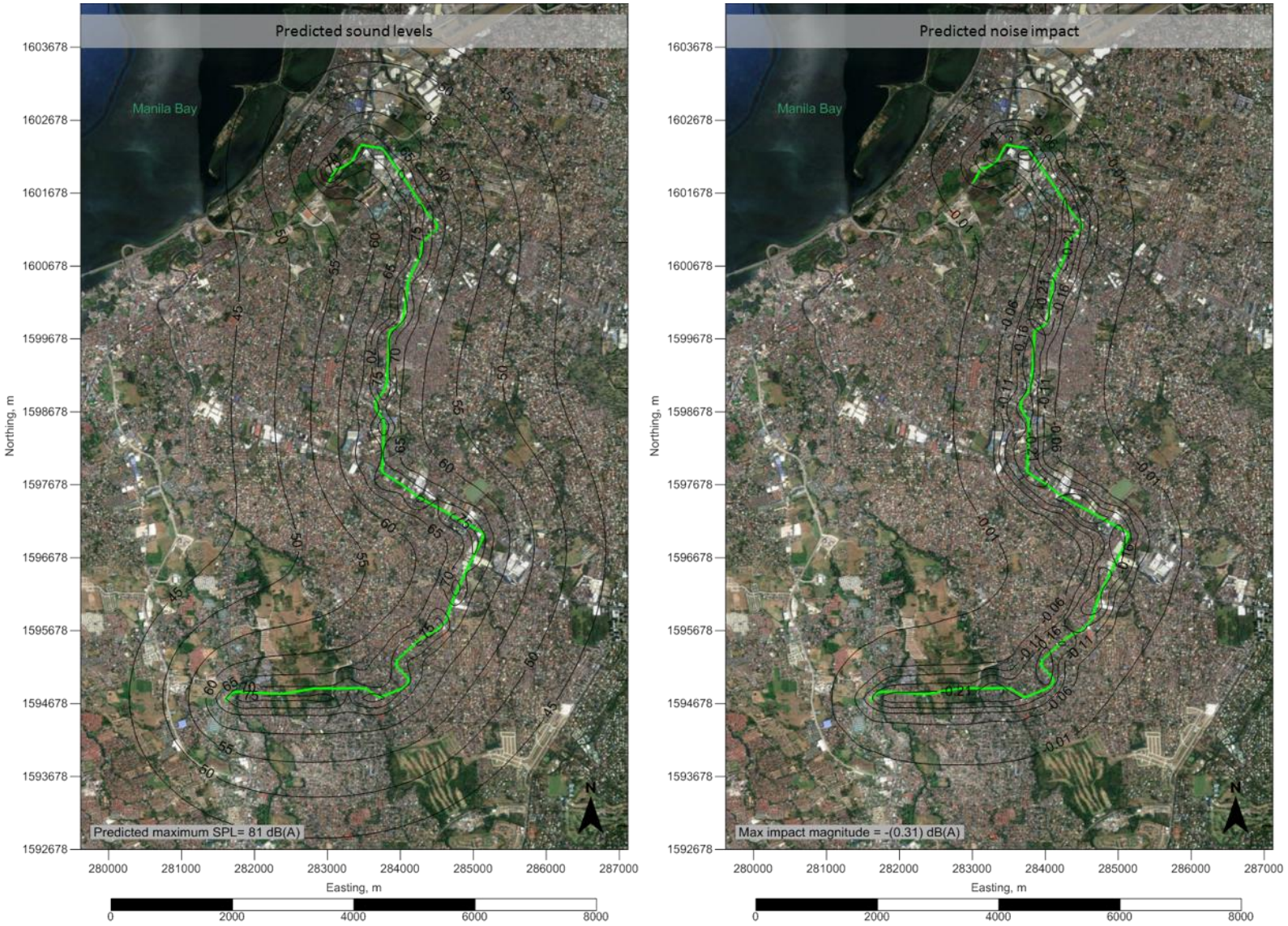


Figure 3-53. Isopleths of predicted sound levels and noise impact for the LRT6 Line B.

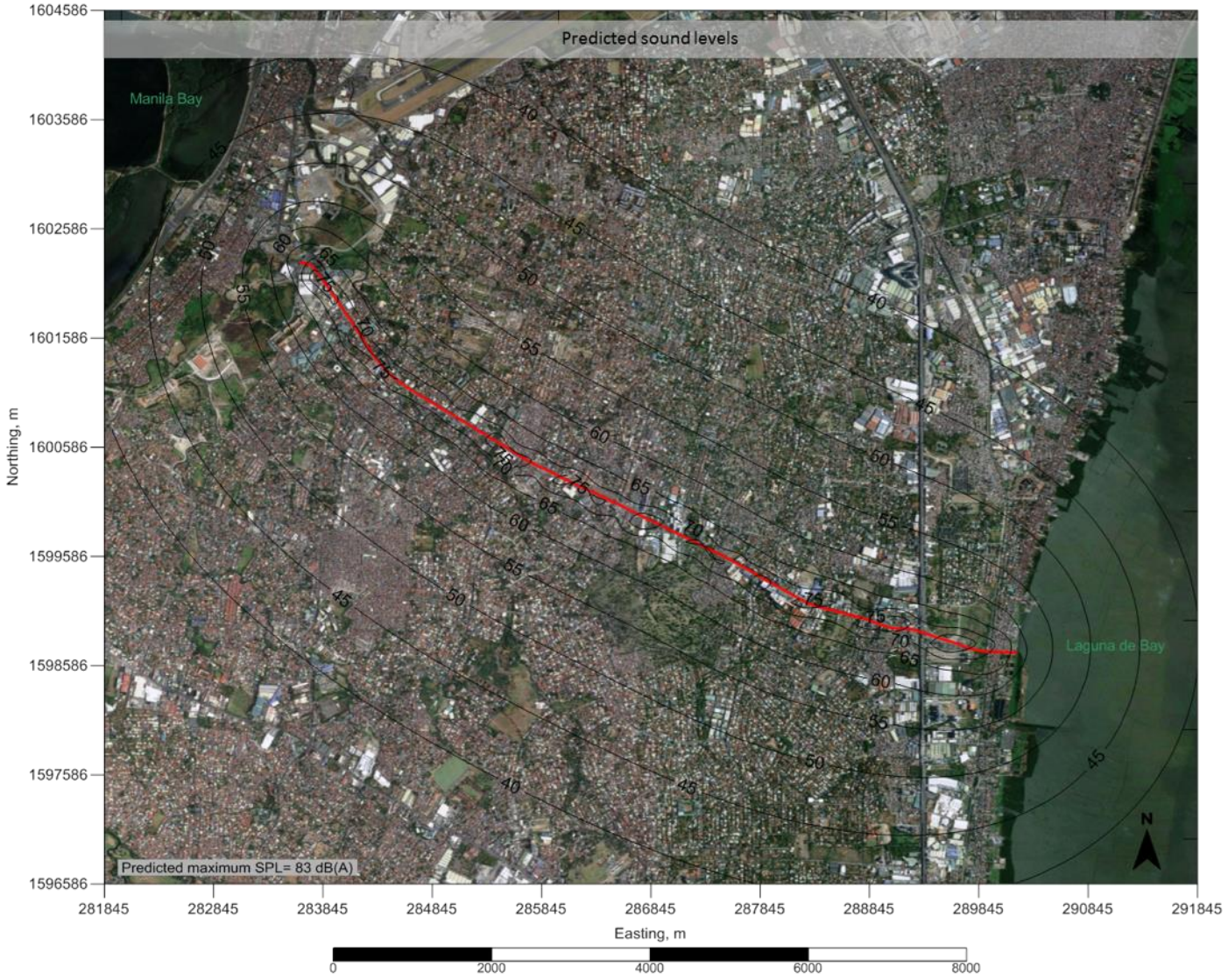


Figure 3-54. Isopleths of predicted sound levels for the LRT6 Line C

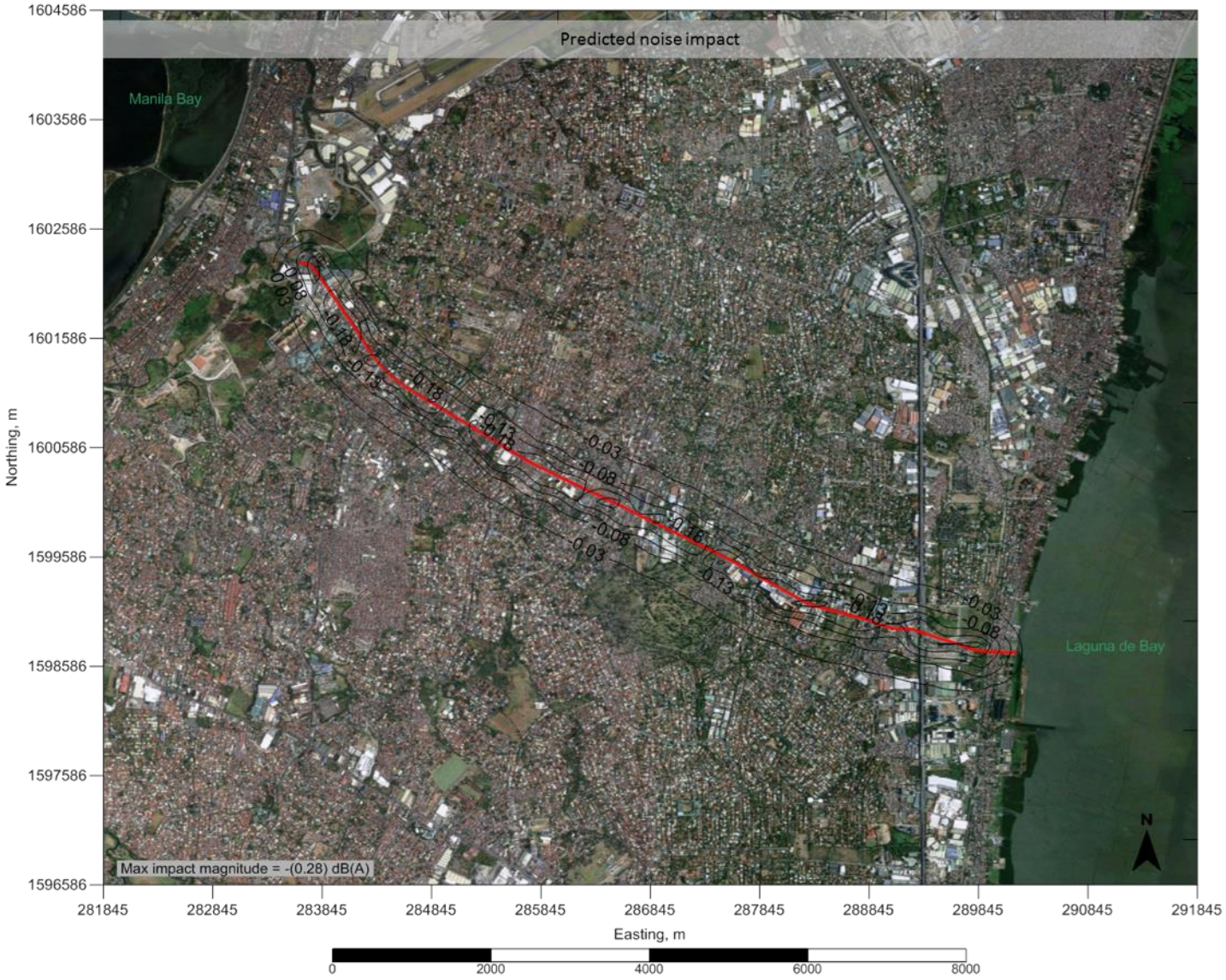


Figure 3-55. Predicted noise impact for the LRT6 Line C

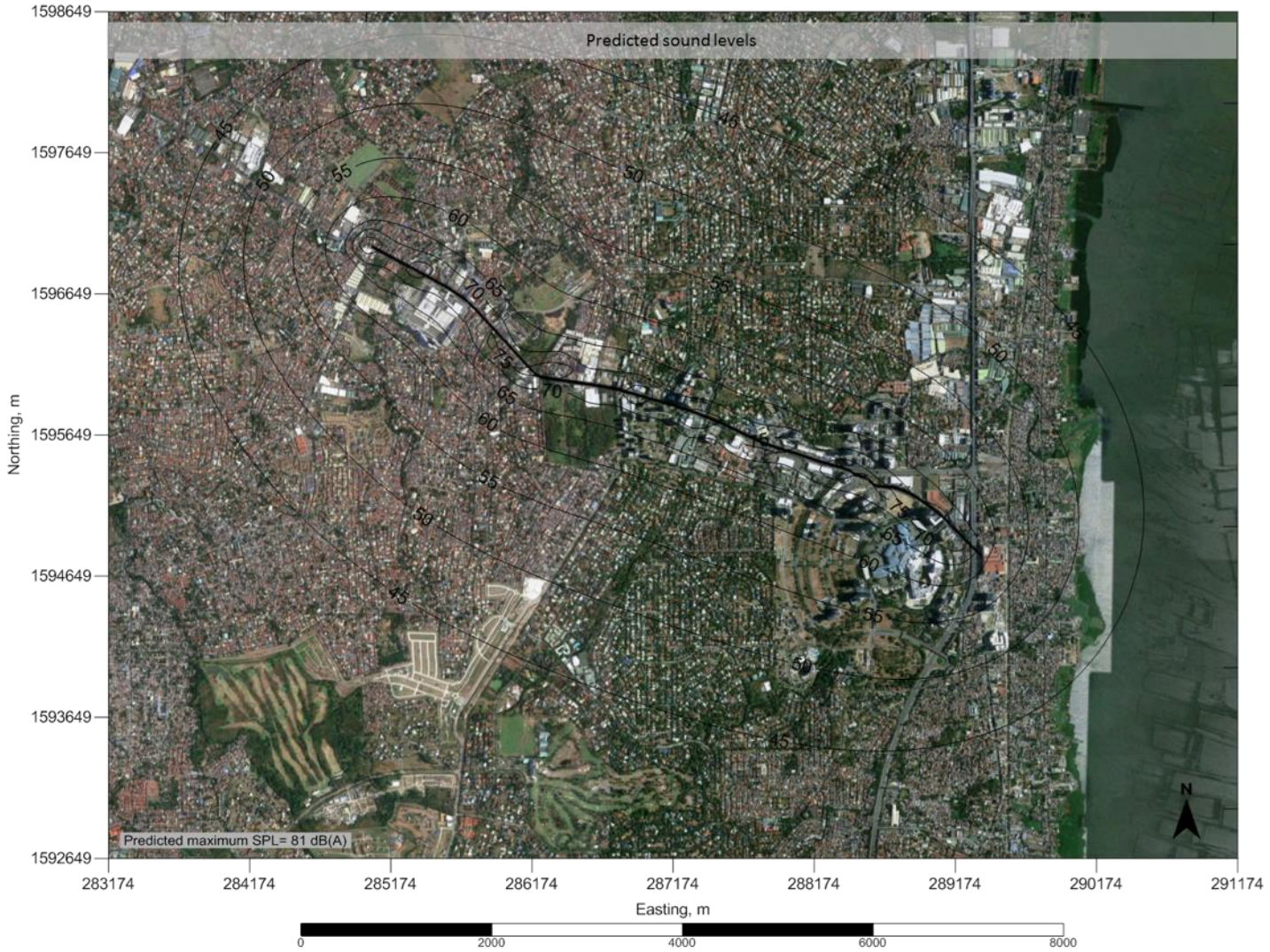


Figure 3-56. Isopleths of predicted sound levels for the Alabang-Zapote LRT Line

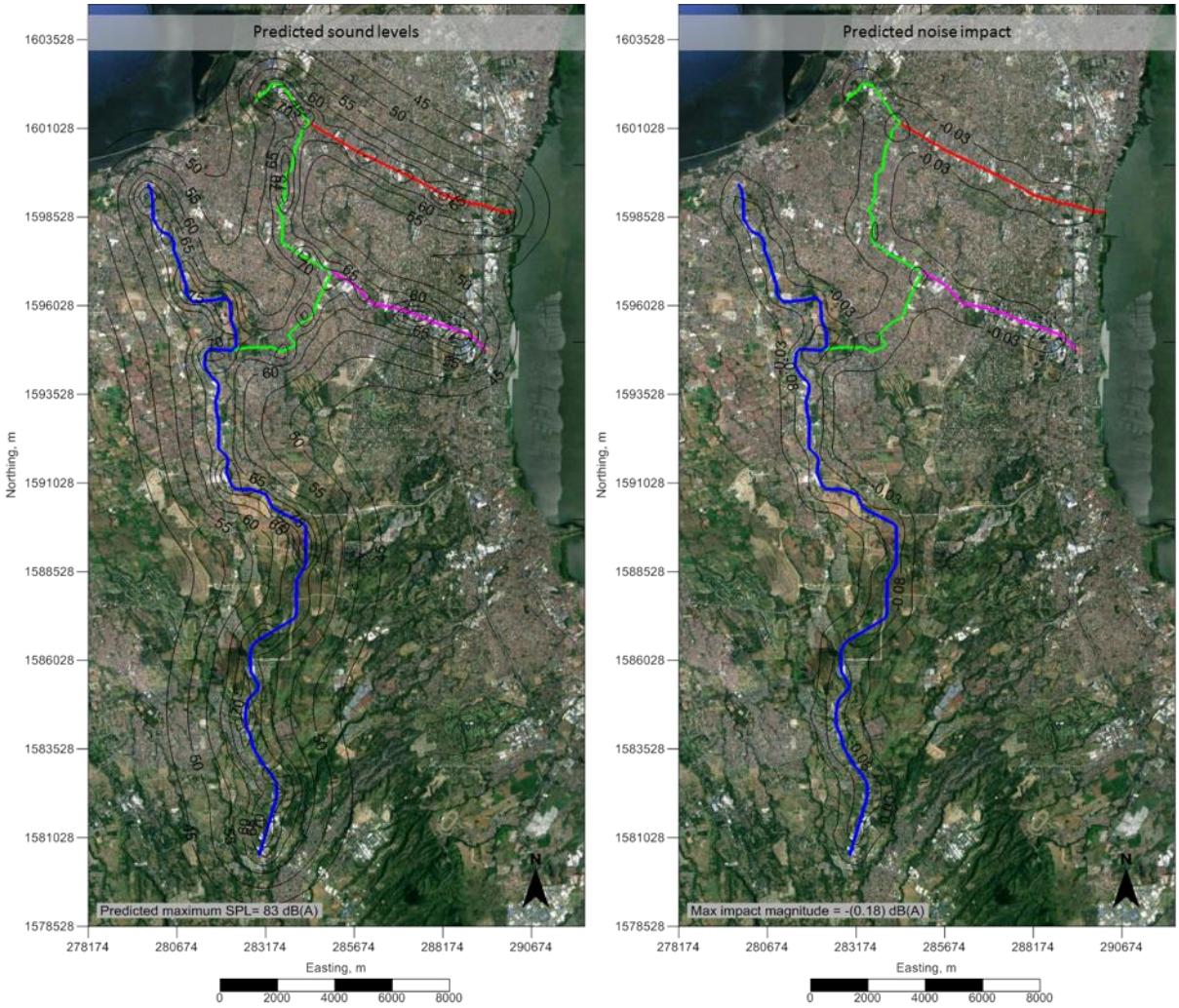


Figure 3-57. Isopleths of predicted sound levels and noise impact for the entire LRT6 alignment

3.4 PEOPLE

3.4.1 Methodology

The section on People of this EIS is a multi-level baseline socio-cultural characterization and social impact analysis of the host areas (35 barangays in the Cities of Parañaque, Muntinlupa, Las Piñas in Metro Manila; and Dasmariñas and Bacoor Cities in Cavite, see **Table 3-56**) within the proposed alignment, and the corresponding social component of the environmental management plan to address the social and economic issues raised by the project stakeholders during the various consultations, key informant interviews and focused group discussions conducted for the project.

The study used secondary data from host regional, provincial, city and barangay government agencies and units. Primary data was gathered through meetings with barangay officials, city-level barangay cluster consultations, and key informant interviews of local government officials, local agency heads, and various stakeholders, either to verify or supplement available data. Five City-level Scoping Meetings were held on various dates on February 2019. Several ride throughs and ocular inspections were also done for thorough project site appreciation.

A perception survey of potentially affected real property owners and renters/business owners was conducted on April 2019 in identified segments of the alignment with right-of-way (ROW) issues (see **Table 3-57**). Polygons of the possible ROW acquisition areas were drawn on Google Earth satellite imageries to delineate the affected areas and pinpoint the affected real properties. This helped the perception survey team to determine the owners and occupants of affected properties (e.g. commercial space renters/business owners). The sample size was 86 respondents equivalent to 60% of the combined number of property owners and renters/business owners or their representatives from the 59 potentially-affected real property assets in identified segments of the alignment.

Table 3-56. List of Impact Barangays

Barangays	City		Barangays	City
1. Bayanan	Bacoor		19. BF International	Las Piñas
2. Ligas 2	Bacoor		20. Manuyo Dos	Las Piñas
3. Ligas 3	Bacoor		21. Pamplona Tres	Las Piñas
4. San Nicolas 1	Bacoor		22. Pulang Lupa Dos	Las Piñas
5. San Nicolas 2	Bacoor		23. Talon Uno	Las Piñas
6. San Nicolas 3	Bacoor		24. Talon Dos	Las Piñas
7. Molino 1	Bacoor		25. Talon Singko	Las Piñas
8. Molino 2	Bacoor		26. Ayala-Alabang	Muntinlupa
9. Molino 3	Bacoor		27. Alabang	Muntinlupa
10. Molino 4	Bacoor		28. Cupang	Muntinlupa
11. Molino 6	Bacoor		29. Sucat	Muntinlupa
12. Niog 3	Bacoor		30. BF Homes	Parañaque
13. Talaba 4	Bacoor		31. La Huerta	Parañaque
14. Paliparan 1	Dasmariñas		32. San Antonio	Parañaque
15. Paliparan 2	Dasmariñas		33. San Dionisio	Parañaque
16. Paliparan 3	Dasmariñas		34. San Isidro	Parañaque
17. Salawag	Dasmariñas		35. Sto. Niño	Parañaque
18. Almanza Uno	Las Piñas			

Table 3-57. Project Segments with ROW issues and Sample Size

Location	Station Location	Length	Sample Size
Canaynay Station	Sta. 101+250	110 m	0
Liana's Supermart	Sta. 101+750	35 m	0
Canaynay-Tionquiao Curve	Sta. 103+250	60 m	14
Alabang Zapote Station	Sta. 105+250	110 m	0
Corner M. Alvarez Curve	Sta. 107+000	80 m	23
Apollo Station	Sta. 108+000	110 m	13
Queen's Row Station	Sta. 109+000	110 m	0
M. Alvarez Extension Curve-1	Sta. 109+250	80 m	12
M. Alvarez Extension Curve-2	Sta. 109+500	110 m	11
M. Alvarez Extension Curve-3	Sta. 110+000	50 m	13

3.4.2 Existing Socio-Economic Conditions

3.4.2.1 The Host Regions: Metro Manila and Region 4A

Metro Manila or the National Capital Region (NCR) is composed of 16 cities and one municipality. Although NCR is known to be the smallest region with a land area of 619.5 square kilometers[15] or 61,950 hectares, it had the second largest population in the country with its 12.88 million residents distributed among 3.10 million households (2015).[16] This translates to a population density of 208 persons per hectare. In 2010, the population density was 191 persons per hectare.[17] With an average population growth rate of 1.7% (in 2000-2015), the region is projected to have 14 million inhabitants in 2030.[18]

The NCR is located between Region 4-A or Calabarzon, with the largest population (14.41 million) among the 18 administrative regions[19] of the Philippines, and Region 3 or Central Luzon with a population of 11.22 million[20]. These three adjoining regions represent a combined population of 38.5 million or 35% of the country's 2015 population.

Considered as the national political, economic and social center of the country, Metro Manila produces more than 37% of the country's gross domestic product. It is also the focal place for finance, commerce, and manufacturing, higher education, research and technology, culture and the arts, media, fashion, tourism, sports, and entertainment. Consulates and embassies of foreign countries naturally converge in Metro Manila and it is the primary chosen site for international conventions and conferences.

The economy of NCR is dominated by the service sector. More than three-fourths of the region's total output can be attributed to services. In 2015, only 0.2 percent was contributed by agriculture, hunting, forestry and fishing; 18.7 percent by industry; and 81.1 percent by services. The economy of NCR grew by 6.6 percent in 2015.[21]

Enclaves or master-planned residential and commercial areas with high-rise condominiums, cyber parks or information technology (IT) centers, research and development companies, upscale super malls, luxury hotels, embassies, and even educational institutions began to sprout in the last two decades. Examples of such are the Eastwood City, Bonifacio Global City, Newport City, Rockwell Center, SM Mall of Asia Complex, UP Town Center,

[15] https://en.wikipedia.org/wiki/Metro_Manila
[16] https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/phl-ocha-ncr_profile-a3_jan2017_1.pdf
[17] https://www.jica.go.jp/philippine/english/office/topics/news/c8h0vm00008wr871-att/140902_01.pdf
[18] http://rssoncr.psa.gov.ph/sites/default/files/2017RSETNCR.pdf
[19] Negros Island Region is the 18th region)
[20] https://psa.gov.ph/content/highlights-philippine-population-2015-census-population
[21] http://rssoncr.psa.gov.ph/sites/default/files/2017RSETNCR.pdf

Circuit Makati, Resorts World Bayshore City, City of Dreams, Aseana City, Solaire, Tiger Resort Leisure & Entertainment, among others.

On the other hand, the NCR is faced with humungous problems of uncontrolled urbanization. The 2014 National Economic Development Authority-Japan International Cooperation Agency (NEDA-JICA) Roadmap for Transport Infrastructure Development for Metro Manila and Its Surrounding Areas[22] pinpoints three major challenges: a) chronic and extreme traffic congestion, b) high vulnerability to natural disasters (flood, earthquake, typhoon, landslide, etc.), and c) a huge backlog in affordable housing and liveable communities or the existence of high-density residential areas and informal settler communities.[23]

The study also cites important facts and figures:

- ✓ Traffic demand in Metro Manila is 12.8 million trips a day (2012). It is projected to increase to 14.5 million trips a day in 2030.
- ✓ Public transport share in total demand is 69%. The same share will stay in 2030.
- ✓ Occupancy of road space by private vehicles is 78%.
- ✓ Transport cost in 2012 was P2.4 billion per day. This will rise to P6 billion/day in 2030.
- ✓ More than 700,000 households in Metro Manila live in high risk and blighted areas and around 560,000 families need resettlement; thus there is at least half a million units backlog in affordable housing (2010).

The same study concludes that the above problems cannot be solved within Metro Manila alone. It recommends an "integrated, innovative and inclusive" regional development strategy of the three administrative regions of Metro Manila, Central Luzon (Region 3) and Southern Tagalog (Region 4A) to form a polycentric Regional Capital Area.

Elements of said strategy involve: a) the redefinition of the spatial structure of Metro Manila which involves a shift from radial/circumferential to ladder form; b) integration of regional clusters with north-south transport backbones (expressway and suburban rail); c) development of hierarchical regional development centers and clusters (i.e. Metro Manila; Subic-Clark-Tarlac, Batangas-Lipa-Lucena growth centers; Bulacan, and Cavite-Laguna planned urban extension areas); d) resource-based economic development; and e) improved connectivity of urban/growth centers and urban/rural areas.

Region 4A or Calabarzon is composed of five provinces, namely: Batangas, Cavite, Laguna, Quezon, and Rizal; 25 congressional districts; 19 cities; 123 municipalities; and 4,011 barangays. Investors eye the region as a good alternative investment site because of its big population, the high concentration of manufacturing industries, the abundance of agricultural produce and raw materials, its proximity to NCR, and its strategic location as a gateway to the south.

The Calabarzon Regional Development Plan 2017-2022 provides the following information.

- ✓ Calabarzon's population in 2015 reached 14.4 million, which is higher than the NCR population by 1.53 million. With an annual growth rate of 2.58 percent between 2010 and 2015, the region's population is expected to double in 2042, much faster than that of the Philippines and NCR. The region's population density of 888 persons per square kilometer is much lower than NCR's 20,247 persons per square kilometer, indicating its potential for expansion. Population growth in the region is attributed mainly to in-migration, population momentum, relatively higher birth rate, and increasing life expectancy.
- ✓ Calabarzon serves as a catch basin for Metro Manila's population and industry. This is reflected in the population density of Cavite at 2,857 per square kilometer, Rizal at 2,204 per square kilometer, and Laguna at 1,725 per square kilometer.

[22] https://www.jica.go.jp/philippine/english/office/topics/news/c8h0vm00008wr871-att/140902_01.pdf
[23] http://rssoncr.psa.gov.ph/sites/default/files/2017RSETNCR.pdf

- ✓ Economic growth in the region averaged 6.2% annually from 2012-2015.
- ✓ Industrial output with 86% of the manufacturing sector contributes 50% to the regional economy. Calabarzon has 53 economic zones with 1,781 industry locators. The breakdown is 35 Manufacturing Special Economic Zones (MSEZ), eight IT Centers, five IT Parks, one Medical Tourism Park (MTP), two Tourism Economic Zones (TEZ) and two Agro-Industrial Economic Zones (AIEZ). Laguna Province hosts 19 economic zones. The other MSEZs are in Cavite and Batangas.
- ✓ The service sector has the biggest employment share of 61%; industry comes second with 26% of the total employed in the region. Agriculture, fishery, and forestry employ only 13%.
- ✓ Calabarzon's tourism industry is on the rise with its distinct mix of tourist attractions that include famous heritage sites in Cavite, interesting landscapes and seascapes for eco-tourism enthusiasts, the enduring local arts and crafts production, the emerging pilgrimage destinations, and its culinary arts and crafts industry.
- ✓ Domestic tourists continue to be the biggest contributor to tourist arrivals in the region. Overnight domestic tourists increased by 34.30% from 2013 to 2014 while same-day visitors grew by 36.96 percent from 2014 to 2015. The number of same-day visitors, alone, climbed to 21.6 million in 2015 - a 147% increase from 8.7 million in 2012. The top three hosts were Quezon (with 24.4% share), Laguna (24%) and Cavite (19%). Foreign tourist arrivals hit the 3 million mark in 2015.
- ✓ Since 2009, the region's poverty incidence has declined from 11.9% to an estimated 9.1% in 2015. Next to NCR which has a poverty incidence of 3.9%, it is the lowest among the other regions and below the national level of 21.6%.
- ✓ Among the identified major challenges in land transport in the region are: (a) traffic congestion along major roads in cities of Calabarzon because these road sections have clearly breached their volume capacity; the Light Rail Transit extension in Cavite is seen as one of the solutions; (b) Road widening projects are hampered by ROW acquisition problems and slow action on the relocation of obstructive utility posts; (c) Access to tourist destinations, industrial areas, and agricultural and far-flung areas remains limited; (d) Quality of national roads deteriorates very fast because of the lack of monitoring of load limits of trucks, and water seepage; and (e) Flooding of roads happens frequently in urban areas.

The Host Province Cavite[24]

Cavite is a first class province with a population of 3.090 million residents distributed among 617,843 households. It is the most populous province in the entire country with a very high population growth rate of 5.05% and similarly high population density of 2,094/square kilometer.

The province has a huge labor force consisting of 1.131 million persons and an employment rate of 84.4% equivalent to 954,754 working persons.

The province is a high-income generator of foreign and local investors. In 2017, Cavite listed a total of 65 economic zones/industrial estates of which 33 are operating, 7 are proclaimed and 25 are still in the process of development. Value of exports and imports from these economic zones are US$5.78million and US$5.8million, respectively.

Business establishments are increasing. In 2017, Cavite had 26, 289 local businesses, from 20,125 establishments in 2016, indicating an increase of 31%.

The province also has a robust financial services sector composed of: (a) 369 BSP-supervised banking financial institutions; (b) 817 BSP-supervised non-banking financial institutions; and (c) 758 foreign exchange dealers, money changers, and remittance centers. Most of them are located in the cities of Dasmariñas, Bacoor, and Imus. A total of 832 ATM units are available all over the province. Its 219 registered cooperatives cannot be underestimated as they represent P4.329 billion in assets and P2.035 billion in paid-up capital.

[24] Cavite.gov.ph

Cavite's tourism attractions include various natural wonders (including caves, falls, and places with cool climate), historical sites, old churches, museums, fiestas/festivals, cultural events, garden communities, leisure farms, vegetable, and flower farms and various agri-tourism sites, golf courses and recreational facilities. Tourism facilities in the province include several hundreds of well-appointed hotels, inns, pension houses and restaurants. The province also has an array of souvenir items and home-grown food products and native delicacies such as tahong chips, Amadeo coffee, mushroom chicharon, jacobina, Good Shepherd ube jam, artisanal tuyo, etc.

Cavite has three tourism growth corridors, namely: (a) Metro Tagaytay which includes the Municipalities of Silang, Alfonso, Mendez, Amadeo, Indang, Magallanes, Gen. Emilio Aguinaldo (Bailen), Maragondon, Ternate and Tagaytay City; (b) Ternate - Corregidor - Naic-Maragondon Area which is attractive because of the presence of world-class beach resorts complementing the area's historical attractions; and (c) Kawit - Cavite City Area, with rich historical landmarks showing the great Caviteño forefathers' role in the fight for Philippine Independence.

The Provincial Tourism Office cited that 5,557,823 tourists visited the province in 2017. Of the total number of tourists, 1,984, 830 were local tourists or domestic travelers while foreign tourists totaled 36,043. Tagaytay City was the most tourist-visited place with 3,536,950 visitors. Second to Tagaytay City was the City of Dasmariñas with 815,242 tourists.

On the other hand, agriculture, though still significant and occupies 42% of Cavite's land area, is on the downtrend. In 2017, Cavite's agricultural area measuring 60,534.77 hectares decreased by 663.38 hectares or 1.08% compared to 2016's 61,198.15 hectares. The decrease was observed mainly in the municipalities of Tanza (150 hectares), Mendez (156.60 hectares), Naic (576.01 hectares), Dasmariñas City (0.56 hectares) and Tagaytay City (14.49 hectares). Silang has the biggest area intended for agriculture with 8,589.78 hectares followed by the municipalities of Maragondon (7,347.67 hectares), Indang (7,189.42 hectares) and Magallanes (5,775.50 hectares). Cavite City no longer has any available land for agriculture-related activities.

Cavite has 72,053 farmers producing food crops (rice, corn, root crops, vegetables); industrial or commercial crops (coconut, coffee, sugarcane, pineapple, mango banana, black pepper, etc.); cut flowers and ornamental plants.

Farmers augment their income by doing backyard livestock and poultry raising. The province has a thriving livestock and poultry industry as proven by its list of 583 commercial and semi-commercial farms.

3.4.2.2 The Host Cities

3.4.2.2.1 Population

The host cities (Las Piñas, Muntinlupa, Parañaque, Bacoor, and Dasmariñas) are all highly urbanized and first class in terms of income levels. The host cities have populations of at least more than half a million and have annual incomes ranging from slightly over P1B to almost P4B (see **Table 3-58**).

Table 3-58. Population, Annual Population Growth Rate[25] and Annual Income by Highly Urbanized City/Municipality: Selected Cities in the National Capital Region and the Province of Cavite (Based on the 2015 Census)

Highly Urbanized City	Population 2015	Population Growth Rate (2010-2015)	Annual Income[26] (PhP)	
			2015	2016
City of Las Piñas	588, 894	1.22	1.978B	2.000B
City of Muntinlupa	504,509	1.78	3.447B	3.890B
City of Parañaque	665,822	2.39	3.150B	3.757B
City of Bacoor	600,609	5.46[27]	1.329B	1.454B
City of Dasmariñas	659,019	2.27[28]	1.647B	1.874B

[25] https://psa.gov.ph/content/population-national-capital-region-based-2015-census-population-0
[26] Blgf.gov.ph
[27] Bacoor City Comprehensive Land Use Plan (2015-2024) and Comprehensive Development Plan (2015-2020)
[28] http://population.city/philippines/dasmarinas/

Except for Las Piñas City, the four cities have annual population growth rates higher than the national population growth rate of 1.72% from 2010 to 2015[29].

From 2015, the population doubling rates of the host cities are 57 years for Las Piñas; 39 years for Muntinlupa; 29 years for Parañaque; 13 years for Bacoor; and 30 years for Dasmariñas.

The population of the host barangays in the five host cities comes to a sum of 1,324,855 as shown in **Table 3-59** and **Appendix 17**.

Table 3-59. The population of host cities and barangays along the project alignments.

City / Barangay	Population		City / Barangay	Population
Las Piñas City			*Bacoor City*	
Almanza Uno	30,405		Bayanan	11,522
BF International Village	77,264		Molino 1	11,926
Manuyo Dos	37,007		San Nicolas 1	7,235
Pamplona Tres	35,612		Ligas 2	4,918
Pulang Lupa Dos	33,171		Ligas 3	7.989
Talon Dos	53,091		Molino 2	37,396
Talon Singko	45,374		Molino 3	58,663
Talon Uno	34,821		Molino 4	51,362
	346,745		Molino 6	18,100
			Niog 3	5,478
Parañaque City			San Nicolas 2	11,285
BF Homes	88,035		San Nicolas 3	32,221
La Huerta	9,669		Talaba 4	3,001
San Antonio	67,401			*261,096*
San Dionisio	63,506		*Dasmariñas City*	
San Isidro	78,912		Paliparan 1	7,153
Sto. Niño	34,860		Paliparan 2	17,881
	342,383		Paliparan 3	68,224
Muntinlupa City			Salawag	80,316
Alabang	63,793			*173,574*
Cupang	58,331			
New Alabang Village	21,429		**Total for 5 host cities and 35 host barangays**	**1,324,855**
Sucat	57,504			
	201,057			

3.4.2.2.2 Economy and Other Features

Las Piñas City[30]

Las Piñas City has a land area of 3,298.61 hectares and is subdivided into 20 barangays. The city used to be associated with salt-making, the Sarao Jeepney, and the Bamboo organ but it is now far from its rural and agricultural past having evolved into a vast residential, a growing commercial and slightly industrial extension of Metro Manila.

As a catchment for the spill-over population of Metro Manila, two-thirds of the land area (2,054 hectares) of Las Piñas was developed into residential areas. The city is host to a few hundreds of residential subdivisions of varying levels from low end to upscale types, traditional settlements, a few on-site resettlement areas, and dramatically down-sized informal settler communities.

At present, the city has no agricultural area. Its 274 hectares of remaining agricultural land in 1985 equivalent to 8% of the city's land area was transformed to other land uses and was totally eliminated as one of the city's land

[29] https://en.wikipedia.org/wiki/Demographics_of_the_Philippines
[30] Data were culled mainly from the Las Pina City Comprehensive Land Use Plan 2014-2034

uses in 1995. Fishpond/salt bed areas comprising 131 hectares or almost 4% of the city's total land area were completely abandoned or converted to other uses by 2011.

Industrial activity in the city has also slid down with the drastically reduced land area for industrial use. Industrial areas measuring 136.44 hectares equivalent to 4.13% of the city's land area in 1995 was reduced to 60.64 hectares (or 1.84%) in 2011. The current CLUP indicates that industrial land will be further brought down to 43 hectares or 1.31% share of the total land area.

The decreasing trend in industrial land uses is attributed to either closure of manufacturing plants (e.g. Goodyear, Boie, Phillips, Saniwares, Borden Inc.) or relocation of companies to other regions and conversion of abandoned or vacated areas (e.g. La Fuerza Compound) to other uses. The remaining industrial establishments are mostly warehouses for storage.

However, important livelihoods of Las Piñas citizens such as parol making, and manufacturing of jeepneys by Sarao and Francisco Motors are still being undertaken. Francisco Motors plans to build a plant in Northern Mindanao. Arts and crafts making from water lily fiber are also gaining a foothold in the city.

On the other hand, commercial areas and other business activities have increased. The CLUP indicates that commercial areas occupy a total of 355 hectares or 10.75% share of the total land area. This is a huge increase from 100 hectares (3.04%) in 1995 and 217 hectares (6.6%) in 2011. Reasons for the rise in commercial areas are a) the conversion of vacated industrial land to commercial use; b) the sprouting of commercial activities along the Friendship Route; and c) the conversion of part of BF-Martin Ville residential site to commercial area.

Mixed use land development projects continue to generate interest and participation from developers like Fil-Estate, Fil-Invest, Stateland, and Ayala Properties Inc.

There is no available updated count of registered commercial establishments in the city. However, numerous shops, micro- and small and medium enterprises (MSMEs), restaurants, fast food chain outlets, banks, and non-banking institutions, public and privately owned markets are located along major city roads and inside malls like SM Las Piñas, Robinson's Las Piñas, Evia Lifestyle Mall, and Vista Mall Las Piñas.

Tourism. The City of Las Piñas has a 10-hectare Historical Corridor along the entire stretch of P. Diego Cera Avenue from the Las Piñas City-Parañaque boundary until Zapote Bridge. This is covered by Barangays Manuyo Uno, Daniel Fajardo, Ilaya, Elias Aldana, Pulang Lupa Uno, and Zapote. Among the tourist destinations are: the Las Piñas Church and Bamboo Organ, several historic bridges, the Old Fire Station and the Gabaldon School Building. However, this area lacks support facilities like hotels, souvenir shops, and restaurants.

Cultural events and celebrations in Las Piñas have a strong charm for tourists. These are the Bamboo Festival, the Water Lily Festival, the Parol (Christmas Lantern) Festival, the Bamboo Organ Concerts, and programmed educational historical tours.

Social Services. Las Piñas health care services are rendered by one government hospital (Las Piñas General Hospital and Trauma Center), 11 private tertiary hospitals and at least 30 well-equipped government health centers (with their own laboratory facilities and lying-in clinics) sufficiently manned. All the hospitals are DOH-certified and accredited by PhilHealth.

Services in public health centers are free. The city government also has a strong referral system with the private hospitals through the Las Piñas Hospitalization Program popularly known as the "Green Card" system.

Las Piñas City teems with educational facilities and resources. It has at least one public elementary school in every barangay for a total of 22; 11 government high schools including one science high school; 13 colleges and universities; and over 200 other formal learning institutions. 80% of all these schools are privately owned. The TESDA in Las Piñas holds at least four batches of skills training yearly.

Muntinlupa City[31]

Muntinlupa City has a total land area of 3.975 hectares and is subdivided into nine barangays. Muntinlupa is now a highly urbanized city. It developed into a progressive and preferred residential and commercial location after its cityhood proclamation in 1995. Its first class governing LGU has surpassed the Php 4billion annual income level in 2016.

The city's long known reputation as "Munti," the site of the National Bilibid Prison of the most dangerous criminals, has now been obliterated by more pleasant images of high-end master-planned enclaves, residential subdivisions (like Ayala Alabang Village) and shopping and leisure centers.

The City recorded 17,295 registered business establishments in 2016, mostly retail and service shops operating in various commercial sites including private and public markets, and 10 malls. Among the malls in Muntinlupa are the Alabang Town Center and Ayala Malls South Park owned by Ayala Malls/Ayala Land; Festival Alabang owned and operated by Filinvest Development Corporation which has an area of 20 hectares; Starmall Alabang (formerly known as Metropolis Star Alabang) owned and operated by Starmalls of Vista Land & Lifescapes, Inc., SM Center Muntinlupa owned by SM Prime Holdings; the Molito Lifestyle Center of Belville Development Corporation, and Vista Land's The Boardwalk at the Lakefront. The city hosts ten hotels including four-star hotels located in the Madrigal Business Park and Ayala-Alabang commercial area.

One of the city's earlier business hubs is the 27.3 hectare Madrigal Business Park located along Alabang-Zapote Road that was developed by Ayala Land in the 1990s. The Madrigal Business Park hosts 11 corporate tower buildings including Alabang Business Tower, Ayala Life FGU Center, Citibank Frabelle, and Westgate Tower.[32]

Car dealerships (about 19) also abound in Muntinlupa. Most are located along the Alabang-Zapote Road in Barangays Alabang, Ayala-Alabang and Cupang. Ford Motors Alabang has a five-floor facility covering a floor area of nearly 13,000 square meters including a two-floor, 23-vehicle showroom and a four-floor and an 80-bay service center. Toyota Alabang also constructed a facility with a showroom, parts warehouse, office & service facilities in a 5,000 m^2 lot. Other car dealerships in the city include Audi Alabang, Chevrolet Alabang, Chrysler Alabang, Mitsubishi Motors Alabang, Nissan, and Suzuki Alabang, Hyundai Alabang, Isuzu Alabang, and Honda Alabang.

Muntinlupa City also has Information technology (IT) hubs. Among them are: a) Capital One Philippines Support Services Corp.; b) Convergys Philippines Corp; c) HSBC Electronic Data Processing (Philippines), Inc.; d) Genpact; e) Verizon Business; and f) Northgate Cyberzone. Northgate Cyberzone is an IT park within Filinvest Corporate City in Alabang. The 18.7 hectare, PEZA registered IT zone was designed, mastered-planned and built around the needs of technology-based companies engaged in Business Process Outsourcing (BPO), Knowledge Process Outsourcing (KPO), education, learning and firm, software design and multimedia, call centers, e-commerce, banking and financial services, as well as other IT support businesses and the like. It is home to office buildings and spaces for lease.

The recorded total capitalization of businesses in Muntinlupa in 2016 was P23.71 billion while gross sales were P230.61 billion. Total employment was 132,908 persons.

Among the industrial establishments in the city are: (1) Kawasaki Motors Philippines Corporation which is in charge of production and distribution of Kawasaki Motors in the Philippines; (2) Amkor Technology, a semiconductor product packaging and test service provider; (3) Pepsi Cola Products Philippines, and (4) Zuellig Pharma.

Data (2015) from the Business Permits and Licensing Office indicate that out of the total number of registered business establishments, 86.56% are micro businesses; 9.8% are small enterprises; 2.8% are medium and 0.78%

[31] Data were culled from the Muntinlupa City Ecological Profile (2016)
[32] Tectonium.com

are large enterprises. The existence of 1,485 stalls at the Muntinlupa Public Market which are profit sources of local entrepreneurs is also noted.

With Laguna Lake at the east side of Muntinlupa, fisheries remain an important economic activity in the lakeside barangays. The city has eight registered fisherfolk associations and eight registered fish pens.

Tourism. The city government has put in significant effort towards its tourism industry which is guided by a Tourism Code and an ordinance requiring all tourism-related establishments to comply with registration and permit requirements. Tourism offerings in the city range from MICE (Meetings, International Conferences, Events and Exhibits); Leisure, Sports, and Recreation; Culture and Heritage; Retirement, Medical and Wellness; to Eco-tourism.

Muntinlupa has seven government-declared historical sites which include the Jamboree Lake, the Memorial Hill, the Japanese Cemetery, and the Insular Life Corporate Center, with a historical marker installed by the National Historical Commission in 1995.

Local cultural events that draw tourists to the city are the Samahang Batya Festival, the Dinagsa Festival, the Senakulo, the Grand Santacruzan, and the Banyahan and Pagoda sa Dagat Festival.

No record on tourist arrivals could be accessed.

Social Services. Muntinlupa City has 11 hospitals (3 government and 8 private) with 426 total bed capacity, 16 lying in or birth centers, and 15 health centers. Medical personnel in the hospitals are 734 doctors, 307 doctor-residents on training, 816 nurses, 121 medical technologists, 6 dentists, 42 midwives, and 69 x-ray technicians.

The City has more than adequate educational institutions, namely: 90 public daycare centers, 109 elementary schools, 69 high schools, 11 colleges and universities (including the Pamantasan ng Muntinlupa and the Colegio de Muntinlupa) and 38 technical/vocational schools.

In 2016, the city government supported 46,300 scholars.

Parañaque City[33]

Parañaque City is composed of 16 barangays covering 4,657 hectares. The city for the past two decades has been going through rapid commercial and business development from its status of being largely a bedroom extension of Metro Manila. The LGU noted the undirected development in the city and this triggered the development of a Comprehensive Land Use Plan in 2006 to put things in order, and to anticipate future requirements of the city. The recent massive developments have led to naming Parañaque as the Mega City by the Bay.

Land for dwellings (almost 50%) dominates the city's territory occupied by residential villages, traditional settlements, scattered pockets of informal settler communities of urban mission areas (though gradually decreasing in number) and several renewed blighted areas or in-city resettlement areas. A portion of formerly zoned residential areas was reclassifed to increase the commercial zones.

Development of government-reclaimed land is quickly transforming the landscape of Parañaque and adjacent cities.

Parañaque City now has two central business districts: the old one in the Baclaran area with corridors along the NAIA Road and Dr. A. Santos Ave.; and the new CBD consisting of: a) the Public Reclamation Authority spearheaded 204-hectare large scale tourism-oriented business enclave which includes the Entertainment City and the City of Dreams along Roxas Boulevard; b) the 200-hectare Asia World; c) the Aseana City; d) the Resorts World Bayshore City; e) the Tiger Leisure Resort and Entertainment Complex; and f) the Ayala Land project aimed

[33] Data were culled from the Paranaque City Ecological Profile, 2017.

to generate 10,000 jobs. These vast areas are seen to accommodate thousands of business and commercial entities including hotels, restaurants, call centers, IT hubs, entertainment, and recreation outfits.

In 2017, the city government issued business permits to 17,640 business and commercial establishments including micro to large businesses. The list includes 630 service entities; 131 banks (mostly commercial); 149 manufacturers; 150 wholesalers; 213 importers; 28 exporters; 40 real estate corporations; 54 holding companies; 66 distributors; 1,169 sari-sari stores, 85 wet and dry markets.

The remaining agricultural areas in the city are pockets of urban farming in Urban Mission Areas or informal settler communities (composed of 25,073 families occupying a total of 45 hectares) needing urgent development. Poor communities are allowed access to vacant areas in their barangays to do vegetable cultivation for food supply augmentation. A few micro-operators (about 50) raise chickens, ducks, and goats.

Fishing thrives within the city's coastal areas along Manila Bay. The LGU recorded 200 municipal fishing boats and 25 commercial fishing vessels.

Social Services. The city population's health care needs are catered to by one government hospital (Ospital ng Parañaque with 120-bed capacity) and eight private hospitals.

Educational institutions abound in the city and include 124 daycare centers, 25 public elementary schools, 66 private elementary schools, 25 government and 50 private high schools, 14 private colleges and 2 government college (Parañaque City College of Science and Technology and the Polytechnic University of the Philippines-Parañaque Campus).

Bacoor City[34]

Bacoor City together with the Cities of Dasmariñas and Imus is said to be part of the "industrial belt" of Cavite, but its economy is dominated by trade and commerce and service-oriented activities. Industrial establishments number only about 50 composed of warehouses and manufacturers of food, garments, and furniture.

This is the consequence of a town which in the 1970s along with several municipalities in Rizal, Laguna, and Cavite, were designated as "bedroom communities" to absorb the expanding workforce in Metro Manila.[35] At present, over 73% of the city's territory is occupied by at least 469 various subdivisions, traditional residential settlements sites, and over 7,500 informal settler families spread in 17 barangays.

New developments in Bacoor include a planned industrial village with supporting residential and commercial facilities to be sited in Barangay Niog. It is intended to house light cottage industries.[36]

Commercial activities and service-related establishments (mainly wholesale and retail outlets, restaurants, eateries, hardware and construction supplies, dry goods) abound in major roads and highways, and in the Bacoor Public Market. Aside from the Poblacion area, commercial activities are observed in malls like RFC Shopping Mall, SM Bacoor, and SM Molino and their environs.

A vast tract of land in the Molino area, dubbed as "New Bacoor" is going through rapid development to hosting institutional, residential and commercial facilities.

The urban sprawl has likewise crawled into Bacoor's agri-fishery areas which have been cut down to 410 hectares or 6.6% of the city's land area. Other sources indicate that only 100 hectares have been left for agriculture and fishing. As such, traditional livelihoods such as farming, salt making, mussel, and oyster culture and fishing have been severely marginalized.

[34] Data were mostly culled from the Bacoor City Comprehensive Land Use Plan (2015-2020)
[35] Calabarzon Regional Development Plan, 2017-2022
[36] En.m.wikipedia.org

Tourism. Bacoor's tourism industry has yet to be fully developed. The city has several historical sites in the Poblacion area or "Old Bacoor." When one thinks of visiting Bacoor, what easily comes to mind are the seafood restaurants along Aguinaldo and Tirona Highways that serve crab, oysters, mussels and fish from Bacoor Bay.

Several areas have been identified for tourism development, namely: a) the Sineguelasan Fish Port which can feature floating restaurants and seafood stall; b) the Molino Dam and the Prinza Dam along Zapote River, which can be designed to become waterside attractions; c) a specific portion of Barangay Molino 4 zoned as eco-development area and can be developed as an ecotourism attraction, among others.

Bacoor also has several festivals that can attract local and foreign visitors such as the Senakulo, the Bakood Festival, and the Marching Band Show, to name a few. The city is actually tagged as the "Marching Band Capital of the Philippines."

Social Services[37]. Health facilities that cater to the health care needs of the Baoor residents include one government hospital, seven big private hospitals, several small private clinics, the city's rural health units, and barangay health stations.

Bacoor's educational institutions consist of two big universities (Cavite State University and the University of Perpetual Help System); seven public high schools; 27 government elementary schools; numerous privately-run elementary and high schools; several private colleges, and technical-vocational schools; and the mandatory daycare centers.

Dasmariñas City[38]

Dasmariñas City, with a land area of 9,013 hectares parceled into 75 barangays[39] has evolved into a highly urbanized, commercialized and industrializing city – far from its largely agriculture-based economy in the 1970s and its status as a government-designated resettlement area of informal settlers from Metro Manila.

At present, Dasmariñas has 188 residential subdivisions, traditional settlement areas and the 523-hectare NHA resettlement site, which for a long time was called Dasmariñas Bagong Bayan (DBB). DBB houses 22,428 households with a population of 148,137residents equivalent to 23% of the 2015 Dasmariñas City population.

Based on the current Calabarzon Centers-Corridors-Wedges Regional Spatial Strategy (CCW-RSS), Dasmariñas has been assigned the role of the regional center, having a heavy concentration of population and markets that serve well beyond its local boundaries. Centers are able to support regional branches of national level franchises and services (e.g. SM regional malls, a range of automobile dealerships, deluxe hotels, call centers), base ports, and residential subdivisions of Metro Manila-based developers. This also means that the city shall further be developed to enhance its role as an administrative center and hub of economic activities for industries, commerce, finance, and services.[40]

Industrialization is a major thrust of Dasmariñas City. Industrial activity takes in various industrial areas located in 15 out of the 75 barangays of the city. These industrial sites include; a) Dasmariñas Technopark with an aggregate area of 38.14 hectares; b) Molave Industrial Estate with an area of 3.2 hectares in Barangay Paliparan II; and c) First Cavite Industrial Estate (FCIE) which covers an approximate area of 154.5 hectares along Governor's Drive at Barangay Langkaan.

The 2015 Inventory of Existing Industrial Establishments bears the names of 60 industrial companies with a total 5,898 employees, Php651,962,500 capital and Php15,293,621,439.69 gross income. Total occupied space of industrial entities is 4.393 million square meters or 439 hectares.

[37] en.m.wikipedia.org
[38] Data were taken mostly from the Dasmarinas City, Comprehensive Land Use Plan 2016-2025 (Updated 2018).
[39] 26 are old barangays while the 49 are located in the Dasmarinas Resettlement Area.
[40] Calabarzon Regional Development Plan (2017-2022)

Industrial products include asphalt mix, rock aggregates, rubber, minerals, electrical parts, apparel, medicines, soft drinks, beer, noodles, and other food items. Popular brands are Kolin, Euromed, Neltex, San Miguel Foods, San Miguel Brewery, Coca-Cola, Pepsi Cola, and Nissin Universal Robina. There are also recognizable Japanese and Korean companies.

City records attest as well to the increase in the number of commercial establishments and demand for commercial space. As of 2015, the city has registered 8,098 business establishments (an increase of 370 from 2014), 1,479 of which are corporations with a total capitalization of Php1,515,158,202.31; 26 are partnerships with a total capitalization of Php19,730,000, and; 6,593 are single proprietorships with a total capitalization of Php73,888,835.59. These figures come to a total gross capitalization of Php2,108,777,037.90.

Further, the Business Permits and Licensing Office of the City of Dasmariñas indicates that 3,173 establishments or 39.18% are involved in retailing while those doing wholesale business are 286 or 3.53% and 405 or 5% are in manufacturing. Contractors recorded a figure of 1,496 equivalent to 18.47% while establishments in the food business totaled to 574 or 7.09%. Registered banking establishments numbered 355 banks or 4.38% while the non-stock non-profit sector showed a figure of 185 or 2.28%. Lastly, there were 97 companies in the amusement business equivalent to 1.5%.

Highly visible commercial centers in the city include the SM City Dasmariñas, Robinson's Place Dasmariñas, The District, Waltermart, Central Mall, Market Mall, Save More, Antlers Commercial, PureGold, Super 8, FSC Highway Plaza, Ultra Mega, Wilcon and two public markets with 1,124 stalls. Both public markets are equipped with facilities and connected by access roads and transport facilities making them accessible not only to the city residents but also to residents from adjoining cities and municipalities. Of the commercial areas in the City, SM City Dasmariñas has the largest area with 101,721 square meters while PureGold occupies the smallest space with an area of 2,512 square meters.

Sporadic sites of commercial activities include Aguinaldo Highway, Molino-Paliparan Road, the Poblacion Area that includes Barangays Zone 1A to IV, Congressional Road, Governor Mangubat Avenue, P. Campos Avenue, Camerino Avenue, Congressional Road from Salitran through De La Salle University, Barangay Salawag which is the location of new private dry and wet markets and Barangay Paliparan II, and the Pasong Lawin area going to the new public market.

Talipapa or mini makeshift market places managed by local associations are also important micro commercial ventures. They are managed by local associations. Seventeen of them serve the needs of locals in various barangays. Occupied floor space ranges from 100 to 1,500 square meters.

Agriculture. Based on space allocation/utilization, agriculture in Dasmariñas is on a downslide. In 2015, only 1,605.30 hectares (17.81%) remained for agriculture - a decline of 293 hectares from 1,899.05 hectares (21.07%) in 2014. The city's agricultural crops are rice, corn, vegetables, fruit trees, banana, pineapple, and sugarcane. Livestock and poultry production and aquaculture are no longer practiced in the city.

Tourism. Unlike most places, the tourist attractions of Dasmariñas City are man-made creations that enjoy popular patronage from both foreign and local tourists. It has 18 resorts, 12 accommodation facilities, the 131-hectare plush, and exclusive Orchard Golf and Country Club, the Museo de La Salle (lifestyle museum depicting 19th century Philippine Illustrado culture, and the Arcontica Cockpit Arena.

The City also lures tourists through its festivals like the Paru-paro festival, the Feast of the Immaculate Concepcion, the Lenten visits at the Dasmariñas City Park, the Sunduan fashion and beauty show, the Independence Day celebration, the Foundation Day event at the Bantayog ng mga Bayani, the City Fiesta featuring multi-awarded brass bands, and the Artista sa Plaza, and its numerous colorful barangay fiestas.

The city's tourism potential including nature-based attributes remains vast. Tourism development is being encouraged in Barangays Zone III, Burol Main, Salawag, Paliparan I, and II, Langkaan I, San Agustin I, Sampaloc II and III for new investors/locators.

Transportation. The city has a total road network of 836.14 hectares in which roads are classified into Provincial, City, Barangay and Subdivision roads.

Aguinaldo Highway is a national highway traversing the City of Dasmariñas. It originates from Coastal Road that links Metro Manila to Tagaytay City. This road serves as the central development spine that links the City of Dasmariñas to neighboring cities and municipalities of Cavite and to Metro Manila. The major roads in the city include Aguinaldo Highway, Salitran-Salawag Road/Jose Abad Santos Avenue, Paliparan-Molino Road, and Governor's Drive with a total length of 40.41 kilometers. The whole stretch is concrete and in good condition.

The provincial roads (Amuntay Road and Don P. Campos Avenue) are 8 kilometers long; the city roads (which are either concrete or with asphalt overlay) have a total length of 37.83 kilometers, and the barangay roads (29.47 kilometers) are all concreted while the subdivision roads have an average length of 583.036 kilometers. Widening of roads has been observed in various places to support tourism and the city economy in general.

Social Services. Educational institutions in Dasmariñas City total 534 schools on various levels. Of these, 468 (88%) are private while 66 (12.35%) are government-operated. A total of 28 public schools and 171 private schools cater to pre-school and elementary pupils. On the secondary level, there are 10 public scholastic establishments and 105 privately owned schools. The city hosts 17 private colleges and universities and 4 vocational schools.

Health services seem to be adequate and have more medical personnel than usual. Health care facilities in Dasmariñas City include two City Health Offices and 75 Barangay Health Stations; the City LGU's Pagamutan ng Dasmariñas; and four private hospitals.

The City Health Office I has 8 beds and is manned by 3 doctors, 14 nurses and 5 midwives. At the Barangay Health Stations, there are 32 beds, 1 doctor, 13 nurses, and 29 midwives. In addition, the Dasmariñas Lying-In Clinic has ten beds.

The City Health Office II has five beds and served by 1 doctor, 14 nurses and 4 midwives. The Barangay Health Stations have 37 beds, 1 nurse and 28 midwives.

The De La Salle University Medical Center has 250 beds and is served by 431 doctors, 265 nurses and 44 midwives. The Emilio Aguinaldo College Medical Center has 154 beds and served by 200 doctors, 81 nurses, and 1 midwife. The Asia Medical Center has 45 beds with a personnel complement of 75 doctors and 68 nurses. The Saint Paul Hospital is equipped with 100 beds and served by 163 doctors and eight 8 nurses.

3.4.2.2.3 Development Direction

The five host cities find common ground and direction from the Luzon Spatial Development Framework (LSDF) of the National Economic Development Authority (NEDA), which is the overarching conceptual tool for land use and development activities for the Luzon Island Group. The LSDF employs three strategies, namely: (a) Concentration- which refers to the distribution of population in existing urban centers and metropolitan areas according to urban hierarchy following the principles of densification, compaction, and smart growth; (b) Connectivity, which is the seamless integration of urban centers, production areas, and protection zones through infrastructure development; and (c) Vulnerability Reduction, which includes hazard mitigation, exposure minimization, protection of elements at risk, and enhancement of adaptive capacity.[41]

Simply put, the LSDF has to do with undertaking effective spatially and ecologically sensitive programs, especially infrastructure building to optimize the economic synergy of Central Luzon, Metro Manila and Calabarzon which

[41] Central Luzon Regional Development Plan, 2017-2022

compose the Greater Capital Region (GCR) where 2/3 of the Philippine GDP is produced and where 40% of the country's population with the highest per capita income live (see **Figure 3-58**).

Under this scheme, Laguna and Cavite in Southern Tagalog along with Bulacan in Central Luzon are geared for further 'planned urban expansion'.

Since Calabarzon belongs to the Luzon island cluster, its center together with the other seven regions in Luzon is NCR.

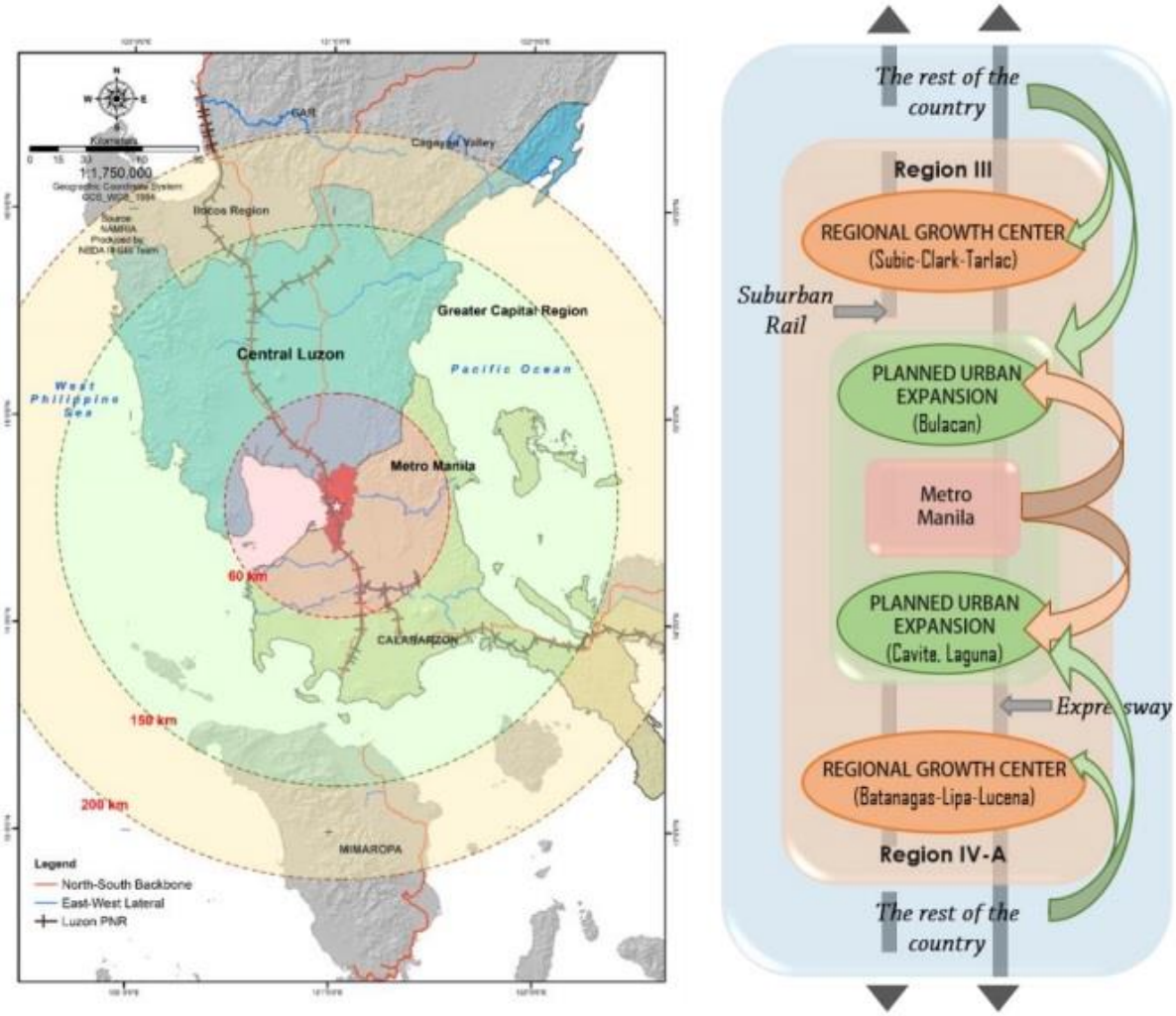


Figure 3-58. Integrated Development Concept of the Greater Capital Region (GCR).

3.4.3 LGU and Community Perceptions towards the Proposed Project

3.4.3.1 *IEC Campaign and the Public Scoping Meetings*

The IEC campaign conducted from 24 October 2018 to 04 December 2018 in the five host cities (Parañaque, Las Piñas, Muntinlupa, Dasmariñas and Bacoor) and 35 host barangays and the five city level Public Scoping meetings (**Table 3-60**) conducted from 18 to 20 February 2019 allowed the Social Team and the project proponents to reach a total of 354 stakeholder representatives and yielded a 100% acceptance of the proposed project (see **Table 1-6**).

Table 3-60. Schedule and Number of Participants in LRT-6 Public Scoping Sessions

City	Date and Time of Scoping Activity	Scoping Venue	No. of Invited Participants	No. of Actual Scoping Participants
Parañaque	0900H, 18 Feb. 2019	Paranaque City Hall	47	46
Bacoor	0900H, 19 Feb 2019	Bacoor City Hall	66	53
Dasmariñas	1300H, 19 Feb. 2019	Island Park Clubhouse	31	23
Las Piñas	0900H, 20 Feb 2019	Villar SIPAG Hall	55	66
Muntinlupa	1300H, 20 Feb. 2019	Max's Restaurant	32	39
		Total	**231**	**227**

In the first series of visits and consultations with LGU officials, four out of the five host City LGUs (except Muntinlupa) and 7 out of the 35 barangay councils knew about the project. Nevertheless, as the project was explained to them and their perceptions about the project were asked, all the visits/consultations ended not only with the stakeholders having a clear idea about the project but also an expressed desire for the project to proceed as early as possible.

Stakeholders expressed outright acceptance of the project because the project is perceived as a solution to the severe traffic congestion being experienced in their areas since the LRT is a fast and convenient means of mass transport and can shorten travel time to and from their places of work or business.

The IEC and scoping participants did not see any major negative impacts (e.g. massive physical displacement of communities) on host areas as the proposed infrastructure was elevated and the foundations and the supporting structures would be built along the midline of major roads. However, the barangay officials expressed their apprehension that road widening might be necessary along the narrower roads (i.e., Molino Road, Paliparan Road, M. Alvarez Avenue). The barangay officials cautioned the project proponent to avoid ROW acquisition in private properties. Some stated that there could be possible livelihood displacement among jeepney/bus drivers and operators and some business establishments. While realizing that traffic problems could arise during the construction period, most of the stakeholders perceive that this would be a temporary impact and traffic is expected to improve after project completion. The stakeholders recommended that the proponent should coordinate early with concerned LGUs and Traffic Management Units to work out appropriate rerouting and traffic management plans with due consideration of ingress and egress of residents in the various subdivisions and settlement areas, and service institutions like schools, hospitals, places of work and worship, markets and commercial areas.

The same atmosphere of project acceptance also prevailed during the series of city-level public scoping meetings. The open forum during the public scoping meetings was spent on the expression and discussion of stakeholders issues and how they should be addressed by the project proponents and concerned authorities (see **Table 1-7**).

Other issues raised in the Public Scoping meetings are listed below:

- How to ensure that host LGUs would be represented in the MMT;
- How the project contractors will manage solid and liquid wastes during the construction period;
- How possible conflict between the project and other planned infrastructures (e.g. flyovers and monorail projects in specific host cities) can be remedied;
- How cases of non-compensation of affected private properties that happened in previous road widening projects can be avoided in case of unavoidable ROW acquisition of private properties;
- How to ensure that the project will be interconnected with other LRT projects;
- How to ensure that concerned LGUs (city and barangays) can be informed early about the project alignment and regularly about project start dates in specific locations and project progress;
- The possibility of including provisions for vehicle terminals and parking spaces near the LRT stations for easy access of LRT riders; and
- Issues about noise and vibration from the project, and the structure's vulnerability to earthquakes from the project.

3.4.3.2 *Perception Survey of Potentially Affected Real Property Owners, Business Owners, and Other Occupants*

As required by EMB, perception survey of potentially affected real property owners and renters/business owners was conducted on April 2019 in identified segments of the project alignment with possible ROW issues as shown in **Table 3-61**. Polygons of the possible ROW acquisition areas were drawn on Google Earth satellite imageries to delineate the affected areas and pinpoint the affected real properties, which helped to track down their owners and occupants (e.g. commercial space renters/business owners). The sample size was 87 respondents equivalent to 60% of the combined number of property owners and renters/business owners or their representatives from the 59 potentially-affected real property assets.

Table 3-61. Potentially Affected Real Property Structures/Owners and Renters/Business Owners (April 2019).

Possible ROW Acquisition Site	Number of Potentially Affected Real Property Structures	Number of Affected Stakeholders			Number of Respondents	Percentage
		Real Property Owners	Renters/ Business owners	Total		
1. M. Alvarez Extension Curve 3	10 properties (5 residential with commercial units and 5 purely commercial structures)	10	12	22	13	59%
2. M. Alvarez Extension Curve 2	7 commercial properties	7 plus 1 property lessor	12	20	11	55%
3. M. Alvarez Extension Curve 1	8 properties (5 residential/commercial and 3 purely commercial) 17 commercial renters 10 renters of residential apartments (not interviewed)	8	17	25	12	48%
4. Apollo Station along M. Alvarez	10 properties (5 residential with commercial units and 5 purely commercial structures)	10	12	22	13	59%
5. Canaynay-Tionquiao Curve	11 properties (8 purely commercial; 1 purely residential; and 2residential/comml) 8property owners 3 Rights holders 13 renters/ business owners	8 plus 3 rights holders	13	24	14	58%
6. Corner Alabang Zapote-M Alvarez Curve	11 commercial properties	11	22	33	23	70%
7. Alabang - Zapote Station along CAA Road* (CAA Tricycle Terminal)	1 commercial lot (parking area of 346 tricycles	1		1	1	
8. Liana's Supermarket * It houses Jollibee, Mang Inasal; the supermarket, the department store, basement parking area, and about 30 retail stalls.	1 commercial property	1		1	Not surveyed	
Total	**59**	**60**	**88**	**148**	**87**	**60%**

*Not included in the survey

The Social Team, with a decision to do a census of the owners and occupants of the identified 59 real property structures, scoured the targetted locations and found out that there were 59 property owners, one small property

developer/manager, and 88 business owners/renters for a total of 148 main stakeholders. Other family members or hired workers/staff were not included in the counting.

As the data gathering proceeded, the Social Team discovered that most of the targetted real properties and business owners were not on-site, thus the perception survey had to make do with qualified substitutes as respondents. There was a total of 87 respondents during the perception survey.

Most (66%) of the potentially affected real properties are residential with commercial structures, about one-third (32%) were purely commercial structures, and one was a two-story house. Based on the appearance, space occupied and nature of business, most of the commercial units are micro-enterprises, which under the MSME categories would have a capitalization of up to P3 million.[42]

The bigger enterprises include the following:

Location	Potentially Affected Property
Canaynay Avenue	Liana's Supermarket which also houses a Jollibee outlet, Mang Inasal, etc.
Marcos Alvarez Avenue and M. Alvarez Avenue Extention	Seven-Eleven Convenience store; Alfa Minimart; McDonald's; Greenhills Arcade; Maxi Fuels Gas Station; Phoenix Petroleum Gas Station; ROH Wheels Corporation; Four A's Cargo Company; a newly-built 16-stall two-story Events and Dining Place; a 40-stall Wet and Dry Market; two multi-door apartment buildings
J. Tionquiao Road	Pericon Building

Stakeholders Attitude/Perception towards the Project

The acceptability of the LRT projects in general among the stakeholders in the alignment sections with potential ROW issues is high as most of them know about the existing LRT's like the MRT and LRT-1. They also know about the LRT Line 1 Extension Project.

When the respondents were asked if they like or accept the proposed LRT Line 6 project in general, the majority (70%) said Yes; 7% said No; 2% said they cannot decide; and one-fifth (21%) said "Don't know" (see **Table 3-62**).

Reasons for liking or accepting the project were: a) LRT is a fast and convenient means of mass transport like the MRT; b) It will ease traffic congestion in their area; c) It will bring more people to their area and therefore can mean bigger or stronger business; d) travel time for commuters will be shorter.

Reasons for those who said No are: a) the project could displace homes and business as the narrow roads in their area may need to be widened and some of them had previous unpleasant road widening experiences like not being properly compensated or not being paid at all by the LGU, DPWH or whatever party is responsible; c) It will affect the livelihood of jeepneys and other public utility vehicles plying specific segments of the proposed LRT alignment.

For those who said they cannot decide or I don't know, they said that they cannot decide or answer for the property or business owner so they might as well not give a clear cut answer.

[42] OECD.org

Table 3-62. Stakeholders' Attitude towards the Project, in General, 6 Sections with Possible ROW Issues.

Section	Total No of Respondents	Attitude towards Project in General										Total %
		Yes		No		Conditional Yes		Cannot decide		Don't know		
		f	%	f	%	f	%	f	%	f	%	
Curve 3	13	9	69	2	15	-	-	-	-	2	15	99
Curve 2	11	9	82	-	-	-	-	2	18	-	-	100
Curve 1	12	9	75	1	8	-	-	-	-	2	17	100
Apollo Station	13	9	70	-	-	-	-	-	-	4	30	100
Canaynay-Tionquiao	14	10	71	2	14	-	-	-	-	2	14	99
Corner Alabang-Zapote & M. Alvarez	23	14	61	1	4	-	-	-	-	8	35	100
Total	**86**	**60**	**70**	**6**	**7**	**-**	**-**	**2**	**2**	**18**	**21**	**100**

Table 3-63. Stakeholders' Attitude towards the Project, If their Properties/Businesses are Affected by the Project, Sections with Possible ROW Issues

Section	Total No of Respondents	Attitude towards Project in General										Total %
		Yes		No		Conditional Yes		Cannot decide		Don't know		
		f	%	f	%	f	%	f	%	f	%	
Curve 3	13	4	31	6	46	-	-	-	-	3	23	100
Curve 2	11	4	36	-	-	2	18	-	-	5	46	100
Curve 1	12	5	42	4	33	-	-	-	-	3	25	100
Apollo Station	13	2	15	4	31	-	-	-	-	7	54	100
Canaynay-Tionquiao	14	8	57	5	36	-	-	-	-	1	7	100
Corner Alabang-Zapote & M. Alvarez	23	3	13	3	13	-	-	17	74	-	-	100
Total	**86**	**26**	**30**	**22**	**26**	**2**	**2**	**17**	**20**	**19**	**22**	**100**

The social acceptability of the proposed project drastically dove down when the respondents were asked the question: "Kung sakaling madadaanan po ng alignment ng LRT Line 6 and inyong ari-arian/tirahan o tindahan/shop/place of business, sang-ayon po ba kayo na matuloy and proyekto?" (see **Table 3-63**).

Only 26% said "Yes, they accept the project and want it to proceed"; 22% said No; 2% gave a Conditional Yes, if they would be given another business space; 20% said they cannot decide for the property owner or the business owner; and 22% said "I don't know."

Those who answered "Yes" said that the project is really worthwhile and it will benefit the country and its citizens. Others said they cannot do anything or go against government projects.

The main reasons for saying "No" are: Nothing will be left of their residence; roads in their area are narrow; loss of business and livelihood; and fear that they might not be properly compensated like in previous road widening projects. Many suggested that the alignment be redesigned to make the project pass through vacant lots and avoid narrow roads and built-up areas in their area (i.e. along Marcos Alvarez extension).

Those who answered, "Conditional Yes" said that they can accept or allow the project to proceed if they will be given an alternative space to live and do business and some form of compensation for the disturbance in their lives and business activities. Stall renters in the private wet and dry market in M. Alvarez Avenue said that they cannot afford the three-month deposit (P60,000 up) being asked by a newer market in the vicinity.

The big chunk of those who said "Cannot decide" (20%) and "Don't know" (22%) is understandable as most of the respondents were substitutes of the property and business owners who were not onsite at the time of data gathering. They said that it was better to answer as they did so as not to compromise the owners of the property and/or business.

Prior Knowledge about the Project

Respondents were asked if they had previous knowledge about the LRT Line 6 Project. 30% said they knew about the project prior to the survey. Sources of information given were: TV news, social media, municipal officials, those working at the City Hall, from the grapevine (sabi-sabi lang) (see **Table 3-64**). It is possible that most of them were referring to the LRT Line 6 that was to pass through Aguinaldo Highway in Cavite and the LRT Line 1 Extension. 35% said it is their first time to hear about the project and that their area was part of the project alignment. 35% did not give any response.

Table 3-64. Knowledge about the Project and their Sources of Infomation about the Project

Response	f	%
Yes	26	30
No	30	35
No answer	30	35
Total	**86**	**100**

3.4.4 Key Project Impacts

3.4.4.1 Unavoidable but limited displacement of residents and businesses along the alignment

Given the current specifications of the proposed project, only specific segments of the 15.4-km alignment of LRT Line-6B+C that will traverse Las Piñas City may need to be cleared of private real property structures to give way to specific station sites and curves of the proposed elevated LRT Line 6 structure (see **Table 3-65**).

Table 3-65. Project Segments with ROW acquisition

Location	Station Location	Length (m)	Need for ROW acquisition
Canaynay Station	Sta. 101+250	110	None
Liana's Supermart	Sta. 101+750	35	Yes
Canaynay-Tionquiao Curve	Sta. 103+250	60	Yes
Alabang Zapote Station	Sta. 105+250	110	None
Corner M. Alvarez Curve	Sta. 107+000	80	Yes
Apollo Station	Sta. 108+000	110	Yes
Queen's Row Station	Sta. 109+000	110	None
M. Alvarez Extension Curve-1	Sta. 109+250	80	Yes
M. Alvarez Extension Curve-2	Sta. 109+500	110	Yes
M. Alvarez Extension Curve-3	Sta. 110+000	50	Yes

The field-cum-perception survey yielded an initial list of 59 private real property assets: 39 residential with commercial structures; and 19 purely commercial ones (including a public vehicle terminal and one two-story house (see **Appendix 18** for Matrix of Affected Structures and Occupants).

Most of the commercial units are micro-enterprises, which under the MSME categories would have a capitalization of up to P3 million.

The bigger enterprises that may be partially affected include: Seven-Eleven Convenience store, a Mini Mart, a McDonald's outlet, the Greenhills Arcade, Maxi Fuels Gas Station, Phoenix Petroleum Gas Station, front lot of ROH Wheels Corporation, Four A's Cargo Company, Pericon Building, a newly-built 16-stall two-storey Events and Dining Place, a 40-stall Wet and Dry Market, and Liana's Supermarket which also houses a Jollibee outlet, Mang Inasal, a department store, and quite a significant number of smaller merchandise and food stalls. Two multi-door apartment buildings were also noted.

Also identified were: 59 property owners plus one small property manager, 88 renters/business owners. It should be noted that there are 40 stall holders in a wet/dry market with rooms for rent (sleeping areas of vendors) and that the newly constructed events place has 16 still unoccupied food stalls.

The above are all subject to detailed parcellary surveys and strict ground verification based on project specifications to determine actual ROW acquisition requirements.

It is important to note the project proponent's policy to limit ROW acquisition to the minimum necessary level and to abide by the Right of Way Acquisition Law (Republic Act No. 10572) and other pertinent laws.

No informal settler areas were noted in the segments with possible ROW acquisition issues, therefore no involuntary resettlement of informal settler families is anticipated.

The ROW acquisition in other lines and segments is less of a problem as the potentially affected areas are privately controlled properties of the proponent.

3.4.4.2 In-migration

The moderate number of workforce required during project construction and operation will not trigger migration in significant numbers since work in specific segments are transitory and will be on programmed short-term work schedules.

However, the project being part of the north-south road network spine of Luzon Island that connects the three regions of Central Luzon, Metro Manila and Calabarzon will definitely draw southward migration towards the five host cities located in Metro Manila and Cavite Province and even other provinces of Southern Tagalog.

Given the continuing south-based residential, commercial and industrial developments, and the opening of more IT centers, the project will not only improve the mobility of workers within the Metro Manila - Cavite corridor but could also spur millennials to settle down in the still open subdivisions in the five host cities. For example, Las Piñas City, alone, has new subdivisions such as the 78-hectare Portofino at Daang Hari and Daang Reyna; Versailles, Jeanette Garden (1 and 2) in Pulang Lupa; Frontera in Talon 2 and Ashberry State in Manuyo Dos.

Dasmariñas City along with Lipa (Batangas), Sta. Rosa (Laguna) and the municipality of Taytay (Rizal) has been included in the List of the 10 Next Wave Cities where continued growth of the information technology and business process management (IT-BPM) sector is expected. Information Technology (IT), Business Process Outsourcing (BPO) and Creative Industries (CI) are three interrelated fields that have significantly contributed to the growth of the Philippine economy in recent years, and investors are now targetting expansion areas outside of Metro Manila. This sector is dominated by millennial age professionals.

3.4.4.3 Impacts on Indigenous Peoples

No Indigenous peoples communities, ancestral domains or ancestral lands were noted in the host barangays and host cities of the project. As such, the project has no impact on IPs.

3.4.4.4 Impacts on Cultural/lifestyle change

The historical and cultural resources were discussed in an earlier section and fortunately, none of the locations of historical sites of the five host cities is part of the proposed alignment. Metro Manila has only one UNESCO World Heritage Site which is the Baroque Church of San Agustin in Manila. Calabarzon has none.[43]

Some apprehension was expressed by the Parañaque LGU that the proposed project could cause an overcrowding effect in the city's Old Business District along Dr. A. Santos Avenue which may affect the commercial appeal of the area.

Residents from certain host barangays in Bacoor City are also worried that their roads may be too narrow to accommodate the LRT Line 6 structure.

The above concerns will be properly addressed by design adjustments to ensure respect of airshed space of neighboring entities and to prevent diminution of values and opportunities of the existing buildings, especially in the narrow roads that will be traversed by the project. Road widening of narrow roads is also seen as a possibility but this has to coordinate with the proper agencies like the DPWH and the concerned LGUs.

3.4.4.5 Threat to delivery of basic services/resource competition

As the project is about easing traffic congestion and improving commuters' mobility, the project is expected to make social services (especially housing facilities, health care, and educational opportunities) more accessible to the host and neighboring populations.

There is no competition with water supply, as the project only requires minimal water supply for its offices, public washrooms, and business locators. The contractor is expected to secure its own water supply during the construction phase.

3.4.4.6 Threat to public health and safety

Since the proposed project has no emissions and therefore no addition to the current pollution load in Metro Manila, this efficient, fast, and economical mass transport system will not bring harmful effects on respiratory health.

[43] En.m.wikipedia.org

Huge infrastructure and electronically-run systems, however, can pose some risks on public safety. These can be remedied by provision of adequate lighting, clear signages, functional security surveillance systems and assignment of an ample number of security personnel in entrance/exit points and along with the platforms.

Health and safety needs (e.g. adequate railings, elevators, clean and appropriately-designated washrooms, elevators) of Vulnerable Sectors (Children, Women/Pregnant Women, LGBT, PWDs, Senior Citizens) should also be considered at the outset.

3.4.4.7 Generation of local benefits from the project

The proposed project has a big potential for job creation. It will require various types of professionals and workers to build and run the transit system. Prior coordination and agreements between the proponent and host LGUs have to be done to ensure that a certain percentage of the workforce from the host areas will be employed during the various phases of the project (e.g. construction to operational stages).

Another area of job generation can come from the micro business locators in the different stations of the LRT system. Earlier LRT projects have allowed ample spaces for various types of businesses, including food, miscellaneous items, ATMs, school supplies, cellphones, and accessories,

Going by the MRT experience which was said to be a factor in the rise in property values along the MRT line by 42%, a similar eventuality can be foreseen in the host cities[44].

Riders of the LRT Line 6 could also save time and costs for transportation. Current LRT fares prove to be cheaper than transport network vehicle service (TNVS, such as Grab, Micab and Owto), taxi and bus rates. These are major advantages for the productivity of workers and businesses.

It will have to be studied if the project will pay any taxes to the host LGUs.

3.4.4.8 Impacts on Tourism

The project will no doubt boost tourism in the five host cities, especially as the current bulk of local tourists that flock to these areas are same-day visitors. The fast, efficient, and comfortable mass transit system will encourage a two-way flow for those from Metro Manila and Calabarzon to leave their homes to relax and unwind in the nearby tourism and leisure destinations and return home on the same day. This would then spur waves of increased economic activity especially in the services sector.

3.4.4.9 Impacts on Traffic

The construction stage of the project will definitely come with some traffic congestion since the locus of construction activities will be along the midline of the host roads. It means that at least one lane will be closed during construction and this will seriously limit the space for vehicles on the road particularly in narrow road sections.

This can be mitigated by advance and careful planning and implementation of rerouting schemes and traffic management including early installation of traffic signages and multi-media announcements of construction schedules, road closures, and alternative routes.

[44] MRT3.com

3.5 TRAFFIC STUDY

A preliminary traffic impact assessment (TIA) was done to evaluate the impact of the project on the transport system within the general area of influence of the project alignments. Since the project is still in the preliminary stage, the expected impacts presented in the TIA are general in nature and evaluated for both the construction and operation phases. Recommendations to address the identified traffic impacts focused on the detailed activities that should be done immediately prior to project implementation and measures including policies that could enhance the effects of the project during the operation phase.

3.5.1.1 Methodology, Scope, and Limitation

A full-blown TIA is typically undertaken in accordance with the flowchart shown in **Figure 3-59** below. The TIA is done to assess the impacts of the project or development into the traffic situation in the area and will involve comparing the level of service (LOS) of the transport network with and without the project scenarios.

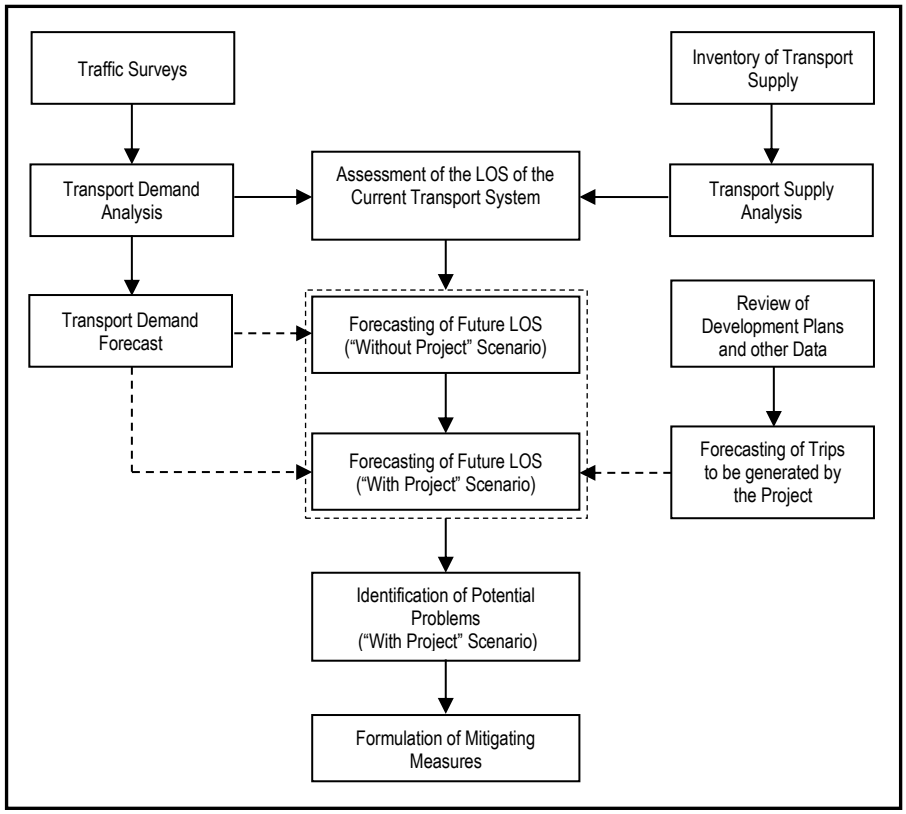


Figure 3-59. Typical methodology diagram for a Traffic Impact Assessment[45].

Essentially, the establishment of the LOS would need several sets of information. These include:

a. A definite project implementation plan. The plan should include details of the construction methods, schedule, and duration;
b. Ridership forecast and a diversion model. The forecast would show the estimated number of person trips which would be catered by the Project while the diversion model would show from what is the original mode of transport of the patrons of the project.
c. Forecasts of the traffic along the roads which will be affected by the Project.

[45] This Methodology Flowchart was first developed by a Study Team led by R.Carreon for the Transport and Traffic Study of Porto Vita Development, Cubao, Quezon City in January 2007

Based on the defined alignment of the Project (as shown in the Project Description), the forecasts of the traffic along the affected roads could be done. However, given that the definite time of implementation of the Project is still unknown to date, the forecast years could not be determined. In the Draft Final Report of the Feasibility Study done in August 2018, it was stated that construction is set to start by mid-2019 and operation is targeted to be by mid-2023. However, it is evident that these targets will not be met.

Further, the ridership forecasts and the diversion model are yet to be finalized. The ridership forecast has been done albeit at a very aggressive assumption that the Project will be operational by mid-2023. The diversion model especially from current private vehicle users has not been established. The latter is an important factor in the assessment of the future vehicular traffic congestion level "with the Project". It is also very important to note that the implementation plan will be greatly dependent on the construction such as (i) methods, (ii) schedules and (iii) durations/timelines.

Due to these limitations, a general description of the possible impacts of the Project on the traffic situation on its area of influence was made. The descriptions covered both the "With project" and Business–as–Usual or "without project" scenarios. Also, the "with project" scenarios were broken down into the construction and operation phases. The discussions were also broken down into the project alignments.

The Project is expected to cater mainly to commuter traffic plying the Metro Manila to Cavite route. It shall cater to the heavily residential areas of Parañaque, Las Piñas, Bacoor, and Dasmariñas, among others. In terms of traffic congestion, it is expected to directly affect major thoroughfares. These include the following:

1. Molino Boulevard;
2. Molino-Paliparan Road;
3. Dr. A Santos Avenue;
4. A. Canaynay Avenue;
5. CAA Road;
6. Marcos Alvarez Avenue;
7. M. Alvarez Extension; and
8. Alabang-Zapote Road

Given that the Project is expected to be an elevated system, in terms of traffic impact, the flow is expected to be (i) affected positively during operation and (ii) negatively during the construction phase.

3.5.1.2 Transport network along the project alignments

LRT Line 6 A

The proposed LRT Line-6A will start at the Niog Station in Bacoor City and will end at Governor's Station in Dasmariñas City. It will pass through sections of Molino Boulevard and Molino-Paliparan Road. The alignment will also pass through several privately owned properties.

Public transport vehicles plying Molino Boulevard and Molino-Paliparan Road include the following:

Road	Jeepneys	Buses (P2P)	Vans (UV Express)
Molino Boulevard and Molino-Paliparan Road	• Molino-Zapote • Talon-Paliparan • Baclaran-Molino-Paliparan • PITX-Paliparan	• Vista Mall Daang Hari to Star Mall Alabang • Camella Dasmarinas Highway to Star Mall Alabang	• Molino-Makati • Molino-Lawton • Molino-Alabang

LRT Line 6 B+C

The proposed LRT Line-6B will start at the NAIA Terminal 1/Terminal 2 Station in Parañaque City and will end at the San Nicolas Station in Bacoor City. It will pass through Dr. A Santos Avenue, A. Canaynay Avenue, CAA Road, Alabang-Zapote Road, Marcos Alvarez Avenue, and M. Alvarez Extension. It will also pass through privately-owned properties before it connects to LRT Line-6A in the vicinity of San Nicolas Station.

The proposed LRT Line-6C will start at the Sucat Station and end at the Lakefront Station. The entire alignment will be along Dr. A Santos Avenue.

The observed routes of public utility vehicles (PUVs such as buses, jeepneys, vans, etc.) passing through the roads that will be traversed by LRT Line-6B+C are tabulated in **Table 3-66**.

Table 3-66. Observed PUV Routes along the Project Alignments.

Road	Jeepneys	Buses	Vans (UV Express)
Dr. A. Santos Avenue	Baclaran-Sucat via N. Aquino	Baclaran-SM Sucat	Quiapo-SM Sucat; Lawton-Sucat
SLEX Sucat Toll Plaza	• Baclaran-Sucat via Quirino (Merville) • FTI-Sucat-Alabang • Baclaran-Sucat Alabang (on Meralco Road) • Alabang-Pasay via Quirino (Merville) • Market Market-Sucat via C5	• Alabang-Novaliches via EDSA • Alabang-Malanday via EDSA • Alabang-Fairview • Alabang-Marilao • Alabang-FTI	• Quiapo-SM Sucat-Sucat Toll Gate • Lawton-Sucat Toll Gate • Market Market-Sucat via C5
CAA Road corner Alabang Zapote Road			• Alabang-Zapote-Baclaran • Alabang-Zapote-Lawton • SM Southmall-Baclaran • SM Southmall-Lawton
Alabang Zapote corner M. Alvarez Avenue	• Pagasa-Molino-Talon • M. Alvarez-Talon-Las Pinas • Camella-Las Pinas • Soldiers Hills-M. Alvarez • Queen's Row-M. Alvarez • Gawaran-SM Bacoor-Molino Road-Niog-Vice Versa (along Magdiwang Road)		

Alabang-Zapote LRT Line

The proposed Alabang-Zapote LRT Line is functionally a spur line emanating from the LRT Line-6B. It will start at the Marcos Alvarez Station and end at the Star Mall Station along the Alabang-Zapote Road in Las Piñas City and Muntinlupa City. PUV routes passing through Alabang Zapote Road are listed below.

Road	Jeepneys	Buses (P2P)	Vans (UV Express)
Alabang-Zapote Road	• SM Molino-Alabang • Alabang (South Station or Star Mall) – Zapote • Alabang-SM Southmall-Baclaran/Zapote/Moonwalk	• Vista Mall Daang Hari to Star Mall Alabang • Camella Dasmarinas Highway to Star Mall Alabang	• SM Molino-Alabang • SM Molino-Palapala-Alabang

The general descriptions of the roads mentioned above are presented in **Table 3-67** below. To date, all of the roads listed in the table are well paved either with concrete or asphalt.

Table 3-67. Roads Affected by the Project Alignments[46]

Road Name	No. of Lanes	No. of Direction	Median	Typical Road Width (m)[47]
Molino Boulevard	4-6	2	No	14-18
Molino-Paliparan Road	4-6	2	No	14-18
Dr. A Santos Avenue	6-8	2	Yes	32-33
A. Canaynay Avenue	4	2	No	14-18
CAA Road	4	2	No	14-18
Marcos Alvarez Avenue	4	2	No	14
M. Alvarez Extension	4	2	No	11-13
Alabang-Zapote Road	4	2	No	17-20

3.5.1.3 Existing transportation/traffic situation

Modal Share

Public transport has always played an integral part to the travel demand characteristics of Metro Manila and its immediate environs including the cities in Cavite affected by the Project. The most comprehensive study on the travel demand characteristics in Metro Manila was the Metro Manila Urban Transport Integrated Study (MMUTIS) which was completed in 1999[48]. Based on MMUTIS, in terms of person trips, it is estimated that more than 12.4 million of the 17.8 million daily person trips are made through different public transport modes. This is equivalent to approximately 70% of the total person trips. On top of these, another 1.5 million or approximately 8.6% of the total person trips are made using "semi-public" modes. These include taxis, High–Occupancy–Vehicles (HOV) Taxis, and private buses[49].

Table 3-68: Traffic Demand by Mode of Transportation in Metro Manila, 1999[50]

Mode		Person Trips		Ave. Occupancy	Vehicle Trips		
		No ('000)	%		No. ('000)	% Vehicle	%PCU[2]
Private	Motorcycle	125	0.7	1.1	114	3.2	1.6
	Car/Jeep & UV[1]	3,289	18.5	2.5	1,316	37.0	37.2
	Truck	422	2.4	2.1	201	5.7	11.4
	Subtotal	3,836	21.6		1,631	45.8	50.2
Semi Public	Taxi	862	4.9	2.2	392	11.0	11.1
	HOV Taxi	226	1.3	4.7	48	1.4	1.4
	Private Bus	440	2.5	22.3	20	0.6	1.1
	Subtotal	1,528	8.6		460	12.9	13.6
Public	Tricycle	2,373	13.4	2.5	949	26.7	13.4
	Jeepney	6,952	39.1	15.1	460	12.9	19.5
	Bus	2,653	14.9	46.5	57	1.6	3.2
	LRT	409	2.3				
	PNR	6	0.0				
	Subtotal	12,393	69.8		1,466	41.2	36.2
Total		**17,758**	**100.0**		**3,556**	**100.0**	**100.0**

[46] Includes those for future consideration. Some of these will only be affected during the construction phase.
[47] Modified LRT Line 6 FS, August 2018
[48] Note: The MMUTIS have recently been updated by the MUCEP. However, there is no publicly available official report yet of the MUCEP
[49] HOV Taxis refer to modes such as FX/AUVs.
[50] Source: MMUTIS Person-Trip Survey,1999
Notes: [1]UV Utility Vehicle; [2]PCU Passenger Car Unit: conversion of different sizes of vehicles in terms of car size for comparison.

In terms of vehicle trips, private and semi-public vehicles account for 45.8% and 12.9%, respectively. Public transport vehicles account for 41.2%. These public transport vehicles include all motorized, land-based public transport modes.

It is important to note that accounting for public transport modes includes both the feeder and main modes. Private vehicles, a single trip utilizes only a single mode, e.g., a car is used from home to office. In contrast, a person using public transport might be using more than one mode to make the same trip. A person who comes from home to his/her office might ride a tricycle (i.e., mode 1) from his/her residence to the terminal then rides a jeepney (i.e., mode 2) to his/her office. This implies that the tabulation of public transport vehicle trips actually includes "double counting" for some trips.

As seen in **Table 3-69**, tricycles account for 26.7% of the total trips. Since these are feeder modes, it is assumed that they are not plying along the main thoroughfares, i.e., including the roads affected by the Project. Given this, an adjustment in the modal share per vehicle type was done. In the adjustment, the tricycle trips were removed. The results are shown in **Table 3-57** below.

Table 3-69: Adjusted Modal Share Per Vehicle Type

	Adjusted Vehicle Trips		
	Mode	No. ('000)	% Vehicle
Private	Motorcycle	114	4.4
	Car/Jeep & UV	1,316	50.5
	Truck	201	7.7
	Subtotal	1,631	62.5
Semi–public	Taxi	392	15.0
	HOV Taxi	48	1.8
	Private Bus	20	0.8
	Subtotal	460	17.6
Public	Tricycle		0.0
	Jeepney	460	17.6
	Bus	57	2.2
	LRT		0.0
	PNR		0.0
	Subtotal	517	19.8
	Total	2,608	100.0

As seen in **Table 3-69**, the mode share of private and semi-public modes increases to 62.5% and 17.6%, respectively. Note that prior to the adjustment their shares are 45.8% and 12.9%, respectively. The share of public transport modes, on the other hand, decreases from 41.2% to 19.8%. Private cars account for more than half (50.5%) of all vehicles on the road.

Traffic Volume

Traffic volume levels within Metro Manila have generally seen growing trends over the years. This is considered to be one of the major reasons for massive infrastructure projects such as the C–5 Extension and the expansion of the Skyway system. **Table 3-70** presents the estimated Average Annual Daily Traffic (AADT) along the major roads affected by the Project. Also shown in the table is the percentage of public transport to the total AADT. Traffic survey data are presented in **Appendix 19**.

Table 3-70: Average Annual Daily Traffic and Percentage Share of Public Transport, 2019[51]

Road Name	AADT	% Public Transport Share[52]
Molino Boulevard	50,337	17.5
Molino-Paliparan Road	30,150	7.7
Dr. A Santos Avenue	49,687	41.9
A. Canaynay Avenue	41,316	25.0
CAA Road	48,195	3.7
M. Alvarez Avenue/Extension	58,671	39.3
Alabang-Zapote Road	90,728	38.8

The AADTs presented in **Table 3-70** above are for both traffic directions and are in vehicle volumes. It could be observed that most of the roads have relatively high traffic volume levels. The share of public transport vehicles to total AADT is also very high. Only CAA Road and Molino-Paliparan Road have public transport modes collectively accounting for less than 17% of the total AADT. This indicates that in the areas where the proposed Project is to be located there are relatively high passenger flow and generally heavy reliance on public transport service.

3.5.1.4 Assessment of Future Traffic Scenarios

3.5.1.4.1 Without Project Scenario

In a "without project" or business–as–usual (BAU) scenario, the traffic volume levels along the main thoroughfares affected by the Project are expected to grow annually. This growth will be due to the continuous developments evident in the area as well as the continuous population growth. LOS along the major roads is expected to worsen due to a lack of policy to curb private vehicle ownership and an obvious under-supply of mass transit service. The Japan International Cooperation Agency (JICA) supported High Standard Highway Network (HSHN, 2010) estimates that within Metro Manila, passenger trips will have an annual growth rate of 1.90% from 2010-2020 and 1.00% from 2021-2035. In the same study, the annual passenger growth rate for neighboring provinces of Metro Manila are estimated to be 3.40% and 2.30% for 2010-2020 and 2021-2035, respectively. With the continuous addition of residential and other types of developments in Metro Manila and adjoining areas, increase in population density is expected to lead to more person trips and, subsequently vehicle trips. This would lead to an increase in the V/C ratio and, hence, a lower level of service rating.

3.5.1.4.2 With Project Scenario

This section presents a general overview of the expected impacts of the Project on the traffic situation in the context of the general travel demand characteristics of the population within its influence area. Given that the Project is a major mass transit system, it is expected to have a significantly positive impact on the mobility of the population in its influence area. However, since the Project is a major infrastructure development, its construction is expected to have a negative implication on the traffic congestion in the affected areas

During Construction

Prior to being operational, the Project will have some negative impacts on the travel demand characteristics of the population in its influence area. During Project construction, the traffic congestion levels along the immediate vicinity of the construction works are expected to worsen. Given the magnitude of the construction works, it is inevitable that partial road closures will be implemented. This would result in a reduction in road capacity. Given

[51] The values for (i) Molino Boulevard and (ii) Molino-Paliparan Road are based on the FS (DFR) August 2018. The presented AADTs in that said report are for 2017. The 2019 values shown in Table 4 above were estimated using a simple growth factor method and an estimated general growth rate of 2.5%. For the rest of the roads, the AADTs were computed using traffic survey data conducted for this study on 10th April 2019.
[52] Public Transport Modes include Public Utility Jeepneys (PUJs), Taxis, UV Express, and Public Utility Buses (PUBs)

that the travel demand will remain constant, the Volume–Capacity (V/C) ratio will be reduced. Hence, the road level of service will inevitably worsen.

At this stage of the project development, the detailed construction method, phasing, and timeline are not yet available. Hence, a detailed analysis of the impacts could not be done only once the implementation plan including the construction methods and schedules are finalized.

In general, most of the construction works will be done along the road center line[53]. During these phases, only partial road closures are expected. Mostly, only the two inner lanes will be closed to traffic. As in similar projects, it is not expected that works will be done simultaneously throughout the alignment. Construction is typically done in phases. Hence, negative traffic impacts will only be felt at the specific site of construction. Further, even if the construction period is expected to be around three years, phasing of the construction will result in a much lower duration of construction per specific site.

As with any mass transit project, major construction works will be done at the stations. It could be expected that after the detailed engineering design (DED), there will be different types of stations. Of the different possible types of stations, the negative effects are expected to be felt more at the station with "jumper" configurations. This type of configuration entails the construction to be done over the entire width of the affected road section.

On the other hand, minimal negative traffic impacts are expected to be felt for stations which will be outside of the main carriageway and at times even outside of the road right–of–way. However, nearby roads will still be affected negatively during the construction due to the mobilization of equipment and the delivery of materials. The volume of equipment and materials for mobilization and delivery is dependent on the final construction method to be used.

In general, during the construction, full or partial road closures may be inevitable. The level and length of disturbance will depend on the final construction method and schedule of project implementation.

During Operation

Being a mass transit system, the Project is expected to provide a higher level of service to the current commuting public and cause a modal shift from those currently using private vehicles to public transportation. The expected ridership of the proposed project will come mostly from the patrons of the currently available public transport service, e.g. jeepneys, buses, and UV express. It is expected, that for similar trips, the project will provide a faster (i.e. lower travel time), reliable (i.e. fixed schedule and headway), and more convenient public transport alternative that the currently available transport services offer.

On another perspective, it is expected that the project will attract some of the current private vehicle users to use public transport instead. This shift will reduce traffic volume levels during a particular time period. Thus, compared to the BAU, there will be less private vehicles on a particular road section once the Project is in operation. This shift is supported by the operation of intermodal facilities in some of the stations. Facilities should include car parking to encourage park-and-ride, bike parking to encourage people to shift to non-motorized modes for the short distance trips (feeder trips) and to mass transit for the main trunk of their trip.

During its operation, the LRT Line-6A, LRT Line-6B+C, and the Alabang-Zapote LRT Line are expected to cause a reduction in the traffic congestion levels along the major roads in their respective influence areas. This will be made possible through a change in the modal distribution of the travel demand of the affected population. A greater impact is the provision of better (i.e. faster, reliable) and more convenient public transport alternative than the currently available transport services offers. This will greatly increase and enhance the mobility of the population within and around their respective influence areas.

[53] This is based on the assumption that the final alignment of the project will be along the road center line.

3.5.1.5 Recommendations

The Project is expected to have a positive impact on the mobility of the affected population in its area of influence since it involves a mass transit system. However, given the construction activities required for its implementation, it is expected to have a negative implication on the traffic congestion in the affected areas during the construction phase.

Once in operation, the Project is expected to be the backbone of the public transport system in the area. It is expected that it shall cause a shift in the modal share including those from private vehicles. This shift will result in a reduction of vehicular volume that will translate to an improvement in the traffic congestion levels. In order to maximize this effect, certain recommendations are to be implemented. These are discussed further in the paragraphs below.

During its construction, the traffic congestion levels in the roads at the vicinity or leading to the construction sites are expected to worsen. During this phase, temporary road or lane closures may be implemented. This depends on the construction method to be used. In order to minimize traffic congestion, it is recommended that Local Traffic Management Plans (LTMPs) be formulated prior to and implemented during the construction phase.

3.5.1.5.1 Local Traffic Management Plans

Prior to the commencement of construction works, each of the contractors should be required to formulate a Local Traffic Management Plan (LTMP). The LTMPs should cover the influence areas of their construction or project site. The LTMPs should be formulated in coordination with the concerned implementing agencies including the Metro Manila Development Authority (MMDA) for areas within its jurisdiction and Traffic Management Departments of the Local Government Units (LGUs). Considering the approved construction methods and schedule, traffic rerouting, if needed, must be detailed in the LTMPs.

The implementation of the LTMPs should be well coordinated with the concerned agencies. The project proponent should ensure their implementation through thorough monitoring.

The formulation and implementation of LTMPs would ensure that the negative impact/s of the Project on the traffic congestion levels in the specific areas of construction would be minimized.

3.5.1.5.2 Public Transport Route Rationalization

In order to maximize the positive impacts of the Project during its operation, a rationalization of the entire public transport system should be done. The Project is a mass transit system which is expected to be used as the primary mode of public transport in its area of influence. Traditional “main” modes such as jeepneys and buses would become the feeder modes once the Project is operational.

Given that intermodal facilities are included in the Project, it is imperative that routes of public transport modes such as jeepneys and buses should be in support of these. Existing routes may be adjusted and new routes may be created. A more detailed study is necessary in order to formulate the most optimal rationalization schemes.

The provision of intermodal facilities may lead to shortening of private vehicle and land-based public transport trip lengths. Travelers may now just travel to the nearest intermodal facility and ride the LRT instead of using their private vehicles or another land-based mode, e.g., PUJs, PUBs, etc., for their entire trip. This would reduce the volume of vehicles on the roads.

The rationalization should be spearheaded by the Department of Transportation (DOTr) in coordination with the LGUs within the influence areas of the proposed LRT Lines.

3.5.1.5.3 Comprehensive Transport Planning and Management

The Government of the Philippines (GOP) is implementing several infrastructure projects which are geared towards increasing network capacity. These include the C5 Extension Project and the expansion of the Skyway System, to name a few. In terms of traffic congestion management, however, these are more of delaying the effects of the problem than a sustainable solution. Traffic congestion, being a perennial problem requires a sustainable solution.

One of the generally acceptable sustainable transport solutions is the provision of high–capacity mass transit systems such as the Project. The Project will provide higher capacity mode to the public transport system which caters to the travel demand of the population within its influence area. However, in order to maximize the positive impacts of the Project, it is imperative that certain restrictive measures be likewise implemented.

With the provision of a mass transit system with high capacity and level of service, it would be possible to implement policies geared towards the reduction of land-based vehicle use. These restrictions should focus especially on the ownership and use of private vehicles.

These restrictions should focus on minimizing vehicle use and in the long term restricting vehicle ownership. Some methods of minimizing vehicle use and ownership include road pricing, giving premiums to park–and–ride patrons, and implementation of stringent requirements and regulations prior to vehicle ownership. In the long term, private vehicle ownership should be restricted. Vehicle ownership should be deemed as a privilege and not a right. A more detailed study on the possible mechanisms to reduce private vehicle utilization and ownership should be undertaken in order to determine the most suitable means.

4 ENVIRONMENTAL MANAGEMENT PLAN

The summary matrix of the environmental management plan according to Annex 2-17 of the Revised Procedural Manual of the Philippine EIA System is provided below while the discussions are presented in the succeeding sections.

PROJECT PHASE/ ENVIRONMENTAL ASPECT	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION, MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE/ FINANCIAL ARRANGEMENTS
I. PRE-CONSTRUCTION/CONSTRUCTION PHASE The pre-construction phase covers the following activities: planning, feasibility study, site investigation, drawing of plans, ocular inspection, acquisition of permits, procurement of services. Earth moving activities, delivery of construction materials and similar activities are included in the Construction Phase.						
A. The Land	Land use and classification	Project can have potential conflict with other planned infrastructure and/or development projects in the area.	Final project design and alignment should be communicated to host LGUs and concerned government agencies.	Proponent	Included in construction cost	Commitment of Proponent and Contractor
	Land use and classification	ROW acquisition will be necessary in some areas along the project alignments.	ROW acquisition should be done in accordance with local and international guidelines and standards. Resettlement action plan should be prepared in consultation with PAPs and concerned LGUs and government agencies.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Land use and classification	Visual impacts may be prominent during project construction	Project should implement less intrusive design that should harmonize with surrounding environment. Construction site should be fenced off and properly maintained. Regular cleaning of construction site should be done.	Proponent	Part of ICC commitment	Commitment of Proponent
	Geology	Loose sediments occur on the eastern end of Alabang-Zapote LRT Line and both ends of LRT Line-6C	Geotechnical investigation must be done to determine thickness of loose sediments and soil properties that will affect final design of structures	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Geology	Geologic hazards prevailing in the project site may affect the proposed LRT structures	Proponent must commit to minimize the effects of geological hazards in the project site. Project design should comply with the National Building Code and the Structural Code of the Philippines	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor

PROJECT PHASE/ ENVIRONMENTAL ASPECT	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION, MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE/ FINANCIAL ARRANGEMENTS
	Soils	Preconstruction and construction activities will generate excavated soils.	Stockpile of excavated soils should be properly managed and reused in the construction site as much as feasible.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Soils	Topsoil will be removed during site clearing	Topsoil should be stored separately so it can be reused for future revegetation activities	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Terrestrial Flora	Clearing of vegetation in the construction areas will occur during the construction phase	Vegetation clearing should be kept to a minimum. Seedlings should be collected and tended in a nursery so it can be used in future revegetation activities	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Terrestrial Flora	Threat to existence, abundance, frequency, and distribution of important local species	Check for the presence of any threatened or endemic species prior to land clearing.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Terrestrial Flora	Exposure to greater potential climate risk and vulnerability	Immediate revegetation right after the construction activities to improve aesthetic appearance of ecology of the project site through the use of appropriate planting materials for landscaping.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Terrestrial Fauna	Construction activities will impact terrestrial fauna	Green spaces should be maintained in areas where land clearing is not necessary. Construction workers and personnel should be made aware of wildlife protection laws.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Terrestrial Fauna	Improperly managed solid wastes can attract wildlife fauna	Soils exposed during construction as well as construction related waste material should be covered. Waste management plan should be enforced for bot solid and liquid wastes generated at the construction sites.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
B. Water	Hydrogeology	Potential inducement of localized flooding due to construction activities	Drainage should be properly designed and constructed to accommodated surface runoff from the construction areas. Regular maintenance should be done to prevent occurrence of flooding.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor

PROJECT PHASE/ ENVIRONMENTAL ASPECT	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION, MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE/ FINANCIAL ARRANGEMENTS
	Water Quality	Groundwater pollution can occur during project construction due to wastewater discharges from the construction camp and discharge of oily wastewater from active construction sites.	Silt traps, sedimentation ponds and oil sumps will be installed in active construction areas. The construction camp and construction site will be provided with sanitary facilities.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Water Quality	Surface water pollution can include siltation from active construction sites, oil and grease contamination from vehicles delivering construction materials and contamination from wastewater discharged from the construction camp.	In addition to the above measures, appropriately labeled waste bins will be provided in the construction areas and worker's camp. Any leaks, drips or spills should be cleaned immediately to prevent contamination of stormwater runoff	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
C. Air	Air Quality	Increased dust generation and fugitive dust pollution is expected during the construction phase	Cover stockpiles of construction materials with bund walls. Bare or exposed areas should be watered down especially during the summer months. Revegetate bare areas as soon as possible. Exposed soil should be compacted. Impose speed limit to vehicles (15-20 kph)	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Air Quality	Gaseous emissions from construction activities will affect the active construction areas	Regular maintenance of construction equipment and machinery will minimize gaseous emissions.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Noise	Increased noise levels from construction activities is expected	Use mufflers on noisy construction equipment. Construction activities should be confined to daytime hours. Install effective noise barriers and absorbers especially along areas with sensitive receptors such as schools and hospitals.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Ground vibration	Ambient ground vibration levels may increase during the construction phase	Construction activities requiring the use of equipment that will increase ground vibration levels should only be used during daytime	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor

PROJECT PHASE/ ENVIRONMENTAL ASPECT	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION, MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE/ FINANCIAL ARRANGEMENTS
			hours to minimize disturbance to nearby communities.			
D. People	In-migration	In-migration can occur during the construction phase if workers from outside the host LGUs are hired for the project.	Prioritize hiring of local skilled and unskilled workers particularly those from host and nearby barangays.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	ROW acquisition issues	Location of project alignment will necessitate the acquisition of ROW in some areas.	ROW acquisition should be done according to local and international standards. Proper consultation should be done with project affected persons and host LGUs.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Threat to delivery of basic services	Construction workers will compete with local residents on the use of health facilities and services in host LGUs.	Hiring of local skilled and unskilled workers will minimize this project impact.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Threat to public health and safety	Air pollution index will increase due to emissions from construction equipment and transportation of supplies to the project site.	Impact on health and allergic reactions may be felt by local residents as well as construction workers. Thus, appropriate personal protective equipment will be provided to all construction workers.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Local benefits from the project	Construction activities will generate employment opportunities for skilled and unskilled workers in host LGUs.	Prioritize hiring of qualified local labor	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Local benefits from the project	Wages earned by construction workers will be spent locally and can create a ripple down effect on the local economy.	Hiring of local workers will maximize the trickle down effect on the local economy.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Local benefits from the project	The barangay and municipal/city LGUs will earn income in terms of permit fees and taxes.	The proponent and contractor should pay all required taxes and permits throughout the construction phase.	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor
	Traffic congestion	Traffic congestion will occur in active construction areas due to lane closures	A traffic management plan should be prepared prior to start of construction activities in consultation with Traffic Management Offices of host LGUs. Delivery of construction materials and installation of	Proponent and Contractor	Included in construction cost	Commitment of Proponent and Contractor

PROJECT PHASE/ ENVIRONMENTAL ASPECT	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION, MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE/ FINANCIAL ARRANGEMENTS
			girders should be done during low traffic periods. Signages and warning signs should be installed in appropriate areas. Traffic rerouting should be communicated to the general public and to host barangays and LGUs.			
II. OPERATION PHASE						
A. Water	Water Quality	Possible impact on groundwater and surface water if untreated wastewater from stations and depot are discharged to the environment	The stations will be equipped with septic tanks while the depot will be equipped with a sewage treatment plant and a separate treatment facility for non-sewage wastewater. Effluent from the treatment plants should meet applicable effluent standards.	Proponent	Included in operating costs	Commitment of Proponent
B. Noise and Vibration	Noise	Train operation will add to existing ambient noise levels along the project alignment	Effective noise barriers should be placed on both sides of the rail tracks especially in areas along the project alignment where sensitive receptors such as schools, hospitals and residential areas are located. Incorporation of noise criteria in the specifications and selection of equipment.	Proponent	Included in operating costs	Commitment of Proponent
	Vibration	Potential increase in ground vibration levels	Trains and tracks should be regularly inspected and maintained. Regular reconditioning of both trains and tracks should be done to minimize increase in ground vibration levels. Adequate installation and footing of structures to reduce vibration. Use of effective noise-attenuating materials.	Proponent	Included in operating costs	Commitment of Proponent Include in MMT manual of operations
C. People	In-migration	The need for manpower during project operation will require hiring of workers from within and outside the host LGUs. This can lead to in-migration particularly if the outside	Prioritize hiring of qualified local workers during project operation.	Proponent	No additional cost	Commitment of Proponent

PROJECT PHASE/ ENVIRONMENTAL ASPECT	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION, MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE/ FINANCIAL ARRANGEMENTS
		workers will bring with them their families.				
	Threat to public health and safety	Threats to public health and safety are possible during project operation	Security personnel should be present in all stations to screen passengers and direct them to safe areas within the stations and platforms.	Proponent	Included in operating costs	Commitment of Proponent
	Local benefits from the project	Train operation will be beneficial for residents working in Metro Manila and other areas along the project alignment since travel time will be shorter.	This will be a positive project impact. Project should be properly managed and maintained to extend this positive benefit to commuters from Cavite and southern Metro Manila.	Proponent	Included in operating costs	Commitment of Proponent
	Traffic	Traffic congestion can occur in areas near train stations	If possible, transfer to other transport modes should be available near train stations to make travel more efficient for train users. Traffic should be managed properly	Proponent	Included in operating costs	Commitment of Proponent

4.1 Land Use

Final project alignment including the location of LRT stations should be communicated to host LGUs to ensure that the proposed project will be considered in the land use and zoning plan of the host cities. Future development projects in the vicinity of the project alignments should also be identified to determine the transportation requirement of these areas.

To avoid conflict with planned infrastructure projects along the project alignments, the proponent should coordinate with concerned government agencies such as DPWH.

The project design should aim to minimize the ROW acquisition along the project alignments. If ROW acquisition is inevitable, ROW acquisition should be done according to existing local and international guidelines on ROW acquisition. A Resettlement Action Plan should be prepared in consultation with the project affected persons as well as host LGUs and concerned government agencies.

Visual impacts can be addressed through the following mitigating measures:

- Implementation of a less intrusive design
- Design and installation of facilities that will harmonize with the surrounding environment in terms of color, etc.
- Proper maintenance of construction site through installation of fence or screens to cover the construction site
- Construction camps, staging areas and construction sites should be cleaned regularly
- Unneccesary equipment and other materials should be removed from the site

4.2 Geology

A geotechnical investigation must be carried out to identify the thickness of the loose sediments and the soil properties that will affect the final design of the structures and other engineering measures.

The project proponent must commit itself to address and minimize the effects of the geological hazards identified in the proposed LRT lines. The susceptibility of the project site to seismic hazards such as ground shaking, liquefaction and differential settlement can be addressed through the implementation of the proper engineering design in accordance to the results of the geotechnical study and in compliance with the requirements of the National Building Code and the Structural Code of the Philippines. The structural specifications that engineers shall recommend for the final design of the LRT stations, footings and foundation must consider the peak ground acceleration for worst-case earthquakes scenarios.

Impacts of ground shaking can be mitigated through appropriate foundation design based on geotechnical and seismicity studies. Ground shaking can result to liquefaction and differential settlement of the tracks and station foundation. This hazard can be mitigated through the conduct of appropriate studies to generate information that can be used to design the structures and reduce the identified impacts.

Monitoring of changes in the geological subsurface during construction and operation phase is recommended. Changes may include rock formations or soil/sand characteristics and cracks that may have significant implications on the design and integrity of the structure.

Proper inspection and maintenance checks should be done for all installed structures and facilities. The structures and facilities should be upgraded based on new technological advances when available to ensure the continuous operation of the project.

4.3 Terrestrial Flora

The recommended mitigating/enhancement measures to address the project impacts on terrestrial flora during the various project phases are provided below and summarized in the succeeding matrix.

Construction Phase

1. Vegetation clearing should be kept to a minimum and clearing should only be done where necessary.
2. Salvage the plants that will be lost to clearing by collecting seedlings and seeds from the proposed construction area, tend them in the nursery for use in re-vegetation of the area.
3. Secure the topsoil from cleared areas and store them in a stockpile for later use during re-vegetation.

Operation Phase

1. Revegetation will be done with minimal use of exotic plants.
2. Use of nursery-raised seedlings collected from the site will be adopted in the landscaping activities.
3. Use of existing endemic and indigenous plants especially the threatened species will be emphasized.

Abandonment Phase

1. Revegetate the open area.

Table 4-1. Mitigating measures for project impacts on terrestrial flora.

Impact	Mitigating/Enhancement Measure
Construction Phase	
Vegetation removal and potential loss of habitat	Vegetation removal and the potential loss of habitat for small animals can be mitigated by keeping the clearing of vegetation to a minimum and only when necessary. Endemic and threatened plants that have been cut should be replaced with individuals of the same species using nursery-raised seedlings/wildlings to ensure higher field survival. These plants can be planted in an area allocated for re-greening the site after the construction. However, the plants in the proposed alignment that will be affected by the construction are common road landscaping plants that are mostly exotics and plants common in open areas.
Threat to existence, abundance, frequency, and distribution of important local species	Checking for the presence of any threatened and endemic plants prior to any land clearing will be conducted to include the recording of the number of different species found. The Owner's Engineer should tap a Forester/Ecologist to check for the presence of threatened and endemic species in the proposed site prior to clearing and to lead in the propagation and management of the out-planted species. Seedlings, mature fruit and seeds should be collected for nursery propagation and field planting.
Exposure to greater potential climate risk and vulnerability	This can be mitigated by re-vegetation right after construction and conducted continuously during operations and closure. This should be part of the overall plan to improve the aesthetic appearance and ecology of the project using appropriate plants.
Operation Phase	
Revegetation	Replanting of selected plants, preferably those threatened, endemic, and bird diversity-related plants, to offset the impact of vegetation loss during the Construction Phase of the LRT 6 project will be conducted. This should be done by the company with preferred ornamental plants, preferably also not alien invasive.
Threat of Alien Invasive Species to Existing Biodiversity	Use of exotic species in landscaping the facilities should be minimized. Avoid use of Octopus tree (*Scheflerra* sp.) and other exotic plants that are invasive. Use of indigenous, endemic and threatened species shall be emphasized. Wildlings and germinated seeds of the indigenous, endemic and threatened species can be used in landscaping the space allocated for the purpose.

4.4 Terrestrial Fauna

The recommended mitigating/enhancement measures to address project impacts to terrestrial fauna are presented below.

Construction Phase

- Maintain greenspaces of original vegetation in areas where land clearing is not necessary.
- Inform drivers of construction-related vehicles of road safety standards.

- Inform construction-related personnel of wildlife conservation and protection laws, policies and actions as well as penalties for non-compliance.
- Inform construction-related personnel of laws, policies, and actions required to apply on injured terrestrial fauna.
- Report and dispose of all injured and dead terrestrial fauna in accordance with DENR standards.
- Appropriately cover soil exposed by construction activities and construction-related waste material.
- Establish and maintain a construction-related waste management plan including solid, septage, sewage and hazardous.
- After construction, the exposed areas should be re-vegetated using bird species-related plants.

Operation Phase

- Use bird diversity-related plants in post construction replanting.
- Inform operations-related personnel of laws, policies, and actions required to apply on injured terrestrial fauna.
- All injured and dead terrestrial fauna should be reported and disposed of in accordance with DENR standards.
- Regularly assess points of bird collision and identify areas of high collision incidences.
- A speed of 70 km/hr or less lowers collision risk with owls (van Rooyen, 2009).
- Establish and implement management plans for all wastes generated during operations, including solid, septage, sewage and hazardous.
- Inform operations-related personnel of laws, policies, and actions in these waste management plans, as well as penalties for non-compliance.

Abandonment Phase

- Establish and implement management plans for all wastes generated during abandonment, including bulk, solid, septage, sewage and hazardous.
- Use bird diversity-related plants in post-operations replanting.

4.5 Hydrogeology

Localized flooding near active construction sites can be avoided through the installation of sufficient drainage to accommodate surface water runoff from the construction sites. Silt control can be done through the installation of siltation and sedimentation ponds.

4.6 Water Quality

Installing oil sumps in active construction sites will minimize the discharge of oil spills and leaks from construction equipment, machinery, and vehicles to surface water bodies. Used oils should be stored in labeled drums and sold to DENR accredited hazardous waste transporters and treaters. Proper and regular maintenance of construction equipment and machinery can reduce the occurrence of oil spills and leaks. Oil sumps can also be incorporated into the project design to minimize oil and grease contamination of surface runoff during project operation.

Installing silt traps in active construction sites can minimize siltation during project construction. Construction materials should be properly stockpiled and appropriate drainage should be provided to minimize siltation. Excavated materials and construction debris should be immediately hauled to dumpsites. Temporary spoils storage areas should have adequate containment and properly sited to reduce sediment transport. Proper handling of materials and equipment during transport should be observed to minimize spills into surface water bodies.

Provision of proper toilet facilities equipped with sewage treatment systems in construction camps and active construction sites will reduce the influx of sewage and wastewater effluents into surface water bodies.

Proper disposal of construction and domestic wastes must be observed during the construction period. A system of waste segregation and collection must be implemented in order to minimize the possibility of wastes being discharged into surface water bodies. Covered waste bins must be provided at strategic locations within the

construction sites for proper waste disposal. Scrap materials and other materials should be re-used as much as possible or sold to recyclers.

Use of appropriate construction, upgrading and maintenance methods to manage drainage and minimize erosion and sedimentation is recommended. Use of appropriate drainage canals can also disperse water flow energy and minimize erosion.

4.7 Air Quality and Noise

4.7.1 Air Quality

Water application (3.2hr intervals) and speed restriction at active construction sites can reduce fugitive particulates generation by 61% and 57% respectively[54].

Trucks delivering construction materials should be covered to prevent fugitive dust from escaping and affecting the areas along the truck routes. Stockpiles of construction materials should also be covered with bund walls.

4.7.2 Noise

Construction phase

An important option in construction noise mitigation is controlling sound at source. Source control techniques may be approached using either muffler requirements or maintenance and operational requirements. Most construction noise originates from equipment powered by either gasoline or diesel engines. A large part of the noise emitted is due to the intake and exhaust portions of the engine cycle. One remedy for controlling much of the engine noise is the use of adequate muffler systems. Reductions of 10 dBA or more can be achieved with optimal muffler systems (U.S.D.O.T) Muffler requirements can be easily integrated in contract specifications with enforcement simple and easily done. Mufflers are effective in reducing engine-produced noise at a low cost to the user.

Poor maintenance of equipment may cause very high noise levels. Faulty or damaged mufflers, loose engine parts, rattling screws, bolts, or metal plates all contribute to increasing the noise level of a machine as well as improper handling and operation. Contract specifications can be written to require that all equipment be regularly inspected for deficiencies in the maintenance area and require the proper training of equipment users.

Another effective approach in reducing noise impacts is using time and activity constraints. Construction activity noise can be minimized or avoided during leisure hours, hours of sleep, and any time where loud continuous noises affect certain special activities. This can be generally accomplished by requiring the contractors to perform such work during daylight hours when the majority of individuals who would ordinarily be affected by the noise are not either present or are engaged in less noise sensitive activities.

Operation phase

The following are some options for reducing sound propagation at source and reducing noise at the receptor[55]:

a. Increasing the distance between the noise source and the receiver. Noise can be effectively reduced by increasing the distance between the source and receiver, e.g., residential areas, schools, etc. Doubling the distance alone from a noise source can reduce its intensity by as much as six decibels;

b. Noise barriers. A noise barrier is an obstacle placed between a noise source and a receiver to interrupt the path of the noise. To function well, a noise barrier must prevent the line-of-sight between the noise source and the receiver. An effective noise barrier can reduce noise levels by as much as 20 decibels.

c. Incorporation of noise criteria in the specifications and selection of equipment

[54] WRAP Fugitive Dust Handbook, 2006 (http://www.wrapair.org)
[55] Hansen, C.H. and Goelzer, Berenice, Engineering Noise Control.

4.7.3 Summary of key impacts and mitigating measures

The key impacts and proposed mitigating measures are summarized in **Table 5-2**.

Table 4-2. Key adverse impacts and mitigation for the air component

Key impact	Potential mitigation(s)
CONSTRUCTION PHASE	
Air pollution due to fugitive particulates	▪ Dust suppression measures, e.g., water application or speed restriction, in active construction areas and access roads; ▪ Compacting of exposed soil surfaces; ▪ Provide tarpaulin cover on trucks loaded with construction materials; and ▪ Hauling of spoils/excavated earth materials immediately after excavation.
Air pollution from SO_2 and NO_2 emissions from heavy equipment and motor vehicles during site preparation and structure erection.	Regular maintenance of heavy equipment and project motor vehicles
Increase in sound levels from construction activities	▪ Maintenance of motor vehicle mufflers; ▪ Provision of barriers and shielding stationary vibrating equipment; and ▪ Scheduling of noisy activities during day time
OPERATION PHASE	
Air pollution (insignificant impact to ambient air quality)	▪ Minimize idling of motor vehicles in parking areas. ▪ Maintenance of standby generating sets.
Noise	▪ Provision of noise barriers ▪ Incorporation of noise criteria in the specifications and selection of equipment

4.8 People

The mitigating measures for the identified project impacts on the socio-economic environment is summarized in **Table 5-3**.

Table 4-3. Mitigating measures for project impacts on the socio-economic environment.

Key impact	Potential mitigation(s)
Unavoidable but limited displacement of residents and business along the alignment of LRT Line-6B	• It the project proponent's policy to limit ROW acquisition to the minimum necessary level and abide by the RO Acquisition Law (RA 10572) and other pertinent laws
Impact on physical and cultural resources	• Concerns on overcrowding of business districts and constraints posed by narrow roads will be addressed through the proper project design to ensure that airshed space of neighboring entities is respected and to prevent the diminution of values and opportunities of existing buildings especially along narrow roads traversed by the project alignment. • Road widening if required should be done in coordination with concerned agencies such as DPWH and host LGUs
Impacts on public health and safety	• Provision of adequate lighting, clear signages, functional security surveillance systems and assignment of sufficient number of security personnel in entrance and exit points and along the platforms will help address concerns on public safety • Health and safety needs of the vulnerable sector (women/pregnant women, children, elderly, PWDs) can be addressed through the provision of adequate railings, elevators, clean and appropriately designed washrooms, escalators, etc.
Impacts on traffic	• Traffic impact during the construction phase can be addressed through advanced and careful planning and implementation of rerouting schemes, traffic management, early installation of traffic signages, and multi-media announcements of construction schedules, road closures, and alternate routes

5 ENVIRONMENTAL RISK ASSESSMENT (ERA) AND EMERGENCY RESPONSE POLICY AND GUIDELINES

5.1 Objectives

This section discusses the Environmental Risk Assessment (ERA) of the proposed Project. Within the context of the Philippine EIS System (PEISS), ERA is an evaluation tool for a project or an activity that determines the level of hazard that it may pose to humans, properties, and to the environment. Conversely, ERA will also determine whether the surrounding environment poses significant risks to the proposed Project. Further, ERA can utilize either a qualitative or quantitative approach.

The objectives of the ERA are 1) to manage potential hazards and unforeseen events that may have adverse impacts to the environment and the people, and 2) provide information for making informed decisions and mechanisms for public safety.

5.2 Approach and Methods

The general guidelines and outline for an ERA preparation are prescribed in Annex 2-7e of DAO 2003-03. It should be noted that the guidelines focus more on the risks and hazards posed by activities and/or manufacturing methods that involve chemical storage, processing, and use.

A risk screening level exercise should be undertaken as part of the ERA. A risk screening level exercise refers to specific facilities or the use of certain processes that has the potential to pose significant risks to people and their surrounding environment. This is presented in the summary of the Risk Screening Matrix (DAO 30-2003 Revised Procedural Manual, Annex 2-7e) vis-à-vis the proposed LRT6 project (**Table 4-1**).

Table 5-1. Risk Screening Level Exercise (Annex 2-7e DAO 30-2003) for the Project.

Activities requiring Risk Screening Exercise	ERA Applicability
1. Facilities for the production or processing of organic/inorganic chemicals	Not Applicable
2. Installations for distillation, refining, and other processing of petroleum products	Not Applicable
3. Installations for total or partial disposal of solid or liquid substances by incineration or chemical decomposition	Not Applicable
4. Installations for the production or processing of energy gases (e.g., LPG, LNG, SNG.)	Not Applicable
5. Installations for the dry distillation of coal or lignite	Not Applicable
6. Installations for the production of metals and non-metals by wet process or electrical energy	Not Applicable
7. Installations for the loading and unloading of hazardous materials as defined by RA 6969 (or DAO 29)	Not Applicable

As may be concluded, the Risk Screening Level Exercise is not applicable to the proposed project.

As presented in Section 2.3.1.1.1 (i.e. Site Susceptibility to Natural Hazards) of this EIS, Metro Manila and Cavite Province along with the rest of the Philippine mobile belt are susceptible to seismic hazards such as ground shaking. The nearest seismic generator to the project site is the West Valley Fault. Movement of this fault, as well as other nearby seismic generators such as Manila Trench on the west and the Philippine Fault on the east, is expected to result to ground shaking in the project site. The northern portions of Las Piñas, Parañaque and Bacoor and the lakeshore areas of Muntinlupa have moderate susceptibility to ground shaking hazards (Daligdig and Besana, 1993). The estimated peak ground acceleration for soft soils is 0.61 g, 0.39 g for medium soils, and 0.22 g for rock (Thenhaus, et al, 1990). The north-northwest segments of LRT Line-6A (Niog Station) and northwest and southeast segments of Line-6B+C (Sucat Station and Lakeshore Station, respectively) are located in areas underlain by soft to medium soils, thus higher peak ground acceleration is expected in these areas. These areas are also susceptible to liquefaction hazards.

The northern and central portions of Parañaque are susceptible to 2- to 10-year floods while the bay areas of Las Piñas, Parañaque, and Bacoor, as well as the lakeshore area of Muntinlupa, are susceptible to 50- to 100-year floods.

The project sites are located in flat areas that are not susceptible to landslides. The coastal areas of Las Piñas, Parañaque and Bacoor are susceptible to storm surges.

Metro Manila has a high susceptibility to typhoons/tropical cyclones and experiences at least two cyclones per year.

The natural hazard susceptibility maps are presented in appropriate sections of the EIS (i.e., geology, climate, and meteorology).

5.3 Discussion

An audit conducted by JICA railway experts on LRT operations reveals that the poor maintenance, obsolete software technologies and depreciated facilities have made the rail transit a dangerous mass transport system[56]. Over time, similar issues may be applicable to the Project, if not addressed.

DOTr and JICA (2017) identified the possible hazards associated during the construction and operation of the Metro Manila Subway System. Considering that the subway project and the LRT 6 have similarities, the hazards identified are applicable to the proposed Project.

These hazards include a) terrorism; b) rail system failure; c) fire; d) occupational safety accidents; e) structural failure; f) crime and violent incidents; g) toxic chemicals; and h) transmission of infectious diseases. These hazards were then subjected to hazard loss severity assessment wherein each hazard was ranked according to the level of exposure and severity of an effect (**Table 4-2**).

Table 5-2. Loss Severity Matrix for the Project.

Rating	People	Financial	Public	Environment
1	1st Aid injury or exposure	Slight damage and downtime <1 day	No effect	Contained. No impact on site, groundwater, noise or air quality
2	Medical aid injury or exposure	Damage and downtime 1-5 days	Precautionary evacuation	<2 m^2 spill on site or any spill off-site <200 li
3	Loss time injury or exposure	Damage and downtime 5-10 days	Medical aid or exposure	>2 m^2 spill impacting air, groundwater or waterway
4	Life-threatening injury or exposure	Damage and downtime >10 days	Serious life-threatening injury or exposure	>5 m^2 on land, any spill impacting air, groundwater or waterway >200 li

Terrorism. The United Nations General Assembly declares that terrorist acts are: "Criminal acts intended or calculated to provoke a state of terror in the general public, a group of persons or particular persons for political purposes are in any circumstance unjustifiable, whatever the considerations of a political, philosophical, ideological, racial, ethnic, religious or any other nature that may be invoked to justify them[57]." Under the Human Security Act of 2007, the legal definition of terrorism in the Philippines is criminal acts as causing "widespread and extraordinary fear and panic among the populace"[58].

Based on records, there had been 40 major bombing incidents since 2000 targeting civilians and property mostly in the southern portions of the country. Metro Manila has not been spared since numerous bombings also occurred in the metropolis. For example, the management of MRT-3 received an alleged bomb threat in January 2019 and

[56] Source; https://www.grin.com/document/377960. Accessed 08 May 2019.
[57] Source: https://en.wikipedia.org/wiki/Terrorism_in_the_Philippines. Accessed 10 May 2019.
[58] Ibid.

consequently issued a ban on bottled water and other liquids as part of its security measure. LRT-1 and LRT-2 followed suit[59]. The ban was subsequently rescinded on April 2019[60]. Earlier in December 2000, a bomb exploded in the front coach of the LRT 1 train that killed 11 people and injured around 60 persons[61].

Rail system failure. This includes failure of rail equipment particularly rail track, signaling/communication systems, and electrical and rolling stock. Failure of these devices due to natural hazards (flood, earthquake, volcanic eruption and the like), natural wear and tear of rail parts, or other forms of accidents may result in derailment. Included in this category is human (driver) error. Several incidents on the LRT and MRT operations have been documented. For example, two MRT-3 maintenance vehicles collided in September 2018[62]. In another incident, an MRT-3 train overshot and rammed a station in August 2014 due to driver error[63]. Other incidents such as coaches disengaging or being detached from the train body have been reported[64]. It was also reported that door pinning and dragging incidents have occurred[65]. Other rail system concerns can be gleaned from the MRT audit report[66]. In May 2019, low power supply in the overhead catenary system caused a temporary disruption of MRT 3 service[67]. In May 2019, two coaches of the LRT 2 collided, resulting in the injury of 32 people[68].

Structural failure. Related to buildings at the depot, stations, structures, as well as all infrastructures where the rail tracks are laid. Failure of these structures due to natural or man-made hazards may result in damage of property and/or loss of human life. Baylon (2017) reported that structures of LRT 1 are relatively safe and strong during ground motions. In another instance, a vehicle rammed into an LRT post in October 2018 as a result of a vehicular collision[69].

Fire. Fire normally occurs during the summer season due to excessive heat. It can also occur due to accidents, equipment failure or faulty electrical systems. Fire may result in damage to property and/or loss of human life. For example, a fire broke out at the LRT-2 Pureza Station resulting in damages to power cables, telecommunication, and signaling wires[70]. In addition, a short circuit cased a fire inside and underneath the middle car of the MRT train in November 2012[71].

Occupational safety accidents. Accidents during construction are not uncommon and may include but not limited to: collapse of scaffolding, falling of construction materials while being lifted by a crane boom, personnel being run over by heavy equipment, accidental fall of workers from an elevated location or in open pits, injury from construction debris and materials, equipment and machinery related injuries, etc. As an example, a box girder fell during construction of the LRT in Jakarta that resulted in five workers being injured[72]. These accidents can be avoided in part with the implementation of HSSE plans.

Crime and violent incidents. Aside from acts of terrorism, crime and violence may occur. These may include but not limited to snatching, pickpocketing, altercations, etc. These may occur in unobserved niches and empty spaces, poorly lit stations, constricted platforms, and crowded facilities. For example, a man committed suicide by jumping

[59] Source: http://www.mrt3.com/index.php/hidden/9-news/554-reason-for-liquids-ban-mrt3-confirms-bomb-threat-ahead-of-jolo-blasts.html. Accessed 15 May 2019.
[60] Source: https://www.philstar.com/nation/2019/04/02/1906677/lrt-1-lifts-liquid-ban. Accessed 06 May 2019.
[61] Source: https://en.wikipedia.org/wiki/Manila_Light_Rail_Transit_System. Accessed 09 May 2019.
[62] Source: https://newsinfo.inquirer.net/1036383/6-hurt-as-two-mrt-3-maintenance-vehicles-collide. Accessed 07 May 2019.
[63] Source: https://newsinfo.inquirer.net/628821/mrt-train-derailed-report. Accessed 07 May 2019.
[64] Source: https://www.rappler.com/nation/188627-commuters-walk-mrt-tracks-coach-gets-detached-train. Accessed 07 May 2019.
[65] Source: https://www.grin.com/document/377960. Accessed 08 May 2019.
[66] Source: https://opinion.inquirer.net/81483/mrt-worst-case-scenarios. Accessed 07 May 2019.
[67] Source: https://www.gmanetwork.com/news/news/metro/694737/electrical-problem-hits-mrt-3-passengers-unloaded/story/. Accessed 17 May 2019.
[68] Source: https://www.manilatimes.net/34-people-hurt-in-lrt-2-train-collision/556861/. Accessed 20 May 2019.
[69] Source: https://newsinfo.inquirer.net/1056630/grab-says-it-is-continuously-reaching-out-to-support-critically-hurt-rider. Accessed 07 May 2019.
[70] Source: https://newsinfo.inquirer.net/924287/news-lrt2-pureza-fire-lighting-strike-reynaldo-berroya. Accessed 07 May 2019.
[71] Source: http://www.mrt3.com/index.php/maintenance.html. Accessed 15 May 2019.
[72] Source: https://www.infrastructureasiaonline.com/construction-project/lrt-projects-construction-accidents-caused-5-people-injured. Accessed 07 May 2019.

from the station platform into an approaching MRT-3 train in May 2013[73]. No data is available with regards to crimes involving theft but is assumed to occur. In fact, the MRT periodically announces that passenger should be careful against pickpockets over the public address system.

Toxic chemicals. These are chemicals utilized and generated as waste from maintenance activities at the depot (e.g. solvent-based cleaning chemicals, grease and used oil) are classified as hazardous. Accidental release or spillage into the environment may contaminate the soil, produce air and surface water pollution. The release of toxic chemicals to the riding public is not included here but under terrorism.

Transmission of infectious diseases. Transmission of infectious diseases is possible through close quarters (e.g. coaches) where spaces could be confined. Pests may also be a problem in railway systems particularly with an accumulation of garbage or standing water.

After identifying the hazards, an exposure assessment is undertaken which an estimation of the the magnitude, frequency and duration of human exposure to the adverse consequences that may occur as well as the assessment of the size, nature and types of receptors that can be exposed to the hazards, sources and emission rates of chemicals and consideration of chemical transport and fate in the environment (**Table 4-3**).

Table 5-3. Probability of Event for the Project.

Rating	Score	Criteria
Almost certain	5	Expected to occur regularly under normal circumstances
Probable	4	Expected to occur at some time
Possible	3	May occur at some time
Unlikely	2	Not unlikely to occur under normal circumstances
Rare	1	Could happen but probably never will

Finally, these were subjected to a risk characterization which is an estimation of the incidence and severity of the effects likely to occur in an "environmental compartment" due to actual or predicted exposure to a hazard (DOTr and JICA (2017). **Table 4-4** presents the result of the risk characterization for the LRT6 Project.

Table 5-4. Risk Characterization Scores and Rating for the Project.

Possible Hazard	Severity				Probability	Relative Risk	Rating
	People	Financial	Public	Environment			
Terrorism	4	4	4	4	3	48	H
Rail system failure	3	3	2	1	4	36	H
Fire	4	4	3	4	2	30	M
Occupational safety accidents	3	2	1	1	4	28	M
Structural failure	4	4	4	1	2	26	M
Security and violence incidents	2	1	1	1	4	20	M
Toxic chemicals	1	1	1	2	2	10	L
Transmission of infectious disease	2	1	1	1	2	10	L

[73] Source: https://news.abs-cbn.com/nation/metro-manila/05/10/13/man-who-committed-suicide-mrt-identified. Accessed 07 May 2019.

Table 4-5 summarizes risk assessment and the corresponding risk reduction measures as adapted from DOTr and JICA (2017).

Table 5-5. Summary of risk assessment and risk reduction measures for the Project.

Possible Risks	Rating	Risk Reduction Measures
Terrorism	High	Tight security measures must be implemented, including passenger security inspections.
Rail system failure	High	Design of LRT6 system shall conform to standards; Regular predictive and preventive maintenance must be implemented.
Fire	Medium	LRT6 Administration must establish fire prevention programs and implement fire and emergency evacuation procedures.
Occupational safety accidents	Medium	Require contractors to strictly follow construction occupational safety and health regulations.
Structural failure	Medium	Design of LRT6 system shall conform to standards; Regular predictive and preventive maintenance must be implemented.
Security and violent incidents	Medium	Tight security measures must be implemented, including passenger security inspections.
Toxic chemicals	Low	LRT6 Administration and contractors must establish and follow emergency and contingency plan for chemical spills.
Transmission of infectious diseases	Low	Regular maintenance of the ventilation system and implement adequate health and safety sanitation programs.

5.4 Emergency Response Policies

5.4.1 Construction Phase

Emergency response planning for construction projects should focus on:

- Work-related injury of construction personnel
- Medical emergencies
- Road traffic accidents
- Lifting equipment failure
- Collapse of scaffolding or fiber-reinforced polymer structure
- Chemical/fuel/oil spills
- Fire and explosion
- Security breach
- Natural disaster

PAVI/LRT6 Operator shall create and implement Emergency Response Plans (ERP) beginning from the detailed engineering design phase until the operation phase. The ERP identifies the prevention of and appropriate actions or responses to accidents or emergency situations. The ERP shall assess and/or identify the hazards and potential risks in the workplace by identifying what can go wrong and determine the consequences should things go wrong. These ERPs shall be periodically reviewed and updated as necessary. Once the hazards and potential risks are identified, the emergency response plan can be prepared by taking into consideration the following essential components presented below.

Emergency Resources

Determine the available emergency resources available for the identified hazards, including:

- Communication facilities
- Onsite resources such as fire extinguishers, spills containment equipment, first aid kits, etc.
- Emergency response team and estimated response time
    - List names, contact numbers, and area of responsibility of each team member

- List phone numbers of external emergency sources such as the fire department, police, paramedics, hospitals, disaster risk, and reduction management offices, utility companies, etc.

Evacuation Routes

Prepare a map showing evacuation routes that will be used during emergencies as well as the location of fire extinguishers, medical first aid kits, and assembly points or muster stations. The map should be posted in a conspicuous location within the construction site.

Communication Systems

A chain of Command or an organizational flow chart for emergencies shall be prepared to ensure the efficient and effective relay of communications for any incident. Availability of reliable communication systems to relay accurate information quickly should be identified. Location of emergency communication systems, including telephones and two-way radios, must be conspicuously posted within the project site. A backup system should also be in place in the event that phone lines are destroyed or not available during the emergency.

Emergency Response Team

Emergency response team on site, with the following responsibilities:

- The head of the emergency response team should ensure that everyone understands their roles and responsibilities in the emergency response plan;
- Ensure that emergency resources (people or equipment) are updated based on the project's progress; and
- Review emergency response plan on a regular basis especially after an emergency has occurred; changes may be necessary when deficiencies become apparent as the plan is put into operation.

Emergency Procedures

- **Medical**. Clear guidance should be provided on what to do during a medical emergency. When calling the paramedics or ambulance service, information such as the nature of the emergency and exact location of the area to be responded to should be provided. CPR and first aid training for selected personnel are also necessary to be able to quickly provide emergency first aid.
- **Fire**. Personnel should be informed that activation of the nearest fire alarm is the first step during a fire, after which it should be followed by a call for emergency assistance to the nearest fire department. Emergency firefighting equipment should only be used when the fire department has been notified, the fire is determined to be small and not spreading, escape is possible, and proper firefighting equipment is available. Personnel not involved in firefighting should follow the evacuation procedures and the person in charge should determine that no personnel is missing. If it is a large fire, everyone should retreat to a safe distance and wait for the fire department personnel to arrive. Water should not be used to extinguish petroleum or electrical fires.
- **Natural disasters**. Natural disasters such as earthquakes, floods, and extreme weather conditions can affect the construction site. Before evacuating the construction site, it should be ensured that loose construction materials are secure. In the event of an earthquake, keep calm, crop cover and hold and waiting for the shaking to stop. Stay away from heavy structures or materials that may topple during the earthquake. Once shaking stops, evacuate using the identified evacuation routes.
- **Occupational/Rail/Structural accident**. Accidents involving scaffolding, towers, and bridges are common and an emergency response plan for each should be made prior to the commencement of construction activities. All personnel working around these structures should be made familiar with the emergency response procedures in the event that structural accidents occur.

Communication of the Procedure

- To be effective, the emergency response procedure should be communicated to all site personnel before work is started on site;
- The site supervisor should provide information on emergency warning alarms and codes, emergency telephone numbers, location of the nearest hospital, rescue procedures, location of muster points, name of the person who can administer first aid if required, location of emergency response equipment and fire extinguishers
- The procedure should be reviewed with workers, subcontractors, and suppliers to ensure that their activities are covered in the emergency response plan;
- Review new work areas to ensure that hazards are covered in the emergency response plan;
- Post the emergency response procedure in visible areas within the project site

PAVI/LRT6 Operator shall also implement a policy on keeping all construction areas clean and free from unnecessary debris at all times to prevent accidents and emergencies in the workplace. Workers shall also be required to wear PPE while in the workplace. This shall include helmets, facemasks, gloves, safety shoes, ear mufflers, and harness particularly for workers who will be involved in construction activities in the open sea.

PAVI/LRT6 Operator and Contractor shall also institute a policy regarding work during extreme weather conditions.

PAVI/LRT6 Operator and Contractor shall also designate a full time first aider who will attend to medical emergencies. An emergency medical kit shall also be stocked with adequate quantity of medicines and supplies as required in the Occupational Safety and Health Standards (OSHS).

PAVI/LRT6 Operator shall train contractors, employees and emergency response personnel to implement the ERPs. IEC campaigns shall likewise be conducted for the riding public to increase awareness and proper response during accidents or emergencies. Emergency equipment, facilities, and vehicles shall also be acquired and deployed.

Specific to the detailed engineering design, possible emergency scenarios whether naturally occurring or man-made shall be considered to prevent or reduce the occurrence of these emergencies. Some emergency categories that may be considered in the detailed engineering design are natural disasters, construction-related accidents, power failure, structural failure, train collision, train derailment, security concerns (bomb threat, criminal acts, suicide, railway injuries, etc.), fire, etc.

Specific to the Construction Phase, all employees and workers and required to wear the appropriate PPE while onsite. Adequate signages shall be set up at strategic locations to guide or warn employees and workers. These signages shall be properly maintained and updated as necessary. Appropriate barricades shall likewise be deployed to control access to the workplace, staging areas, stockpiles, etc. Equipment must be properly maintained and shall be operated only by qualified or designated personnel. First aid stations including communications and fire protection equipment shall be deployed at strategic locations and maintained. Designated muster (assembly) stations shall be identified so personnel and workers know where to assemble in case of emergency.

5.4.2 Operation Phase

Specific to the Operational Phase, the preventive maintenance measures during emergency situations are presented below (adapted from DOTr and JICA 2018):

Emergency Situation	Preventive Measures
Derailment/Rail System Failure	• PAVI/LRT6 Operator will procure emergency re-railing and rescue equipment. These should be part of the depot equipment. • PAVI/LRT6 Operator will inspect, maintain adjust and replace defective, excessively worn or broken running rails, cross ties, special track work components, ballast, direct fixation fasteners, and other track materials, related hardware and support equipment. • PAVI/LRT6 Operator will also inspect and adjust the smoothness of the alignment and levels of the track geometry. There will be inspections for: - Track geometry and ride quality - Turnouts (which may be combined with regular lubrication and cleaning) - Ultra-sonic testing of rail joints and turnout components. These tests will be based on an annual test in each of the first two years and then scheduled as necessary according to the initial results.
Fire	The Fire Safety Enforcement Manual of the Bureau of Fire Protection Philippine Standards will be principally used as the design criteria of this project as imposed by the laws of the Philippines to be complied with
Typhoon	Speed restrictions or suspension of operation depending on the typhoon signal announced by PAGASA.
Earthquake, Ground Settling, and Liquefaction	Guideway Structures: • PAVI/LRT6 Operator will perform regular inspections by a routine patrol of all rail and depot structures and perform maintenance and repairs. A detailed structural inspection will be performed at least once per year. • The general condition of the structure as viewed from the track will be included in the item list of all route patrols, which are carried out on a regular basis. • All structures will be cataloged and numbered in a register of structures that records the conditions, inspection requirements, results and any corrective actions. • Main structures will be the subject to periodic structural inspections. These inspections will be designed and performed according to general practice according to the structure types, materials (steel or concrete), foundations, and any specific examination of components such as bearing and expansion joints. • Stations and Depot buildings will also be inspected using route patrolling and general route inspections. The inspections will be supplemented with fault reports made by the operational staff. • Should periodic inspection detect signs of ground movement, services will be suspended or be run at reduced speed. If services are allowed to continue, detailed monitoring of the site would be instigated. If services will be suspended, passengers would be de-trained at the next available station stop. A detailed investigation into the improvements required would be undertaken before services are recommenced or speed restrictions are lifted and such works would be put in hand as soon as reasonably. Tracks: • PAVI/LRT6 Operator will inspect, maintain adjust and replace defective, excessively worn or broken running rails, cross ties, special track work components, ballast, direct fixation fasteners, and other track materials, related hardware and support equipment. • PAVI/LRT6 Operator will also inspect and adjust the smoothness of the alignment and levels of the track geometry. • In addition to the patrols described above, there will be inspections for: o Track geometry and ride quality

Emergency Situation	Preventive Measures
	○ Turnouts (which may be combined with regular lubrication and cleaning) ○ Ultra-sonic testing of rail joints and turnout components. These tests will be based on an annual test in each of the first two years and then scheduled as necessary according to the initial results. • Should periodic inspection detect signs of ground movement, services will be suspended or be run at reduced speed. If services are allowed to continue, detailed monitoring of the site would be instigated. If services will be suspended, passengers would be de-trained at the next available station stop. A detailed investigation into the improvements required would be undertaken before services are recommenced or speed restrictions are lifted and such works would be put in hand as soon as reasonably.
Failure of Structure	PAVI/LRT6 Operator will comply with international and national standards to ensure that the structures are designed and built in accordance with these safety standards.
Medical attention required by passengers	For every station, security guards will be equipped with first aid kits. During extreme emergency cases, medical services including ambulance would be summoned to the nearest station by the central supervising station.
Criminal acts	PAVI/LRT6 Operator will provide security services to ensure the safety of passengers, crew and office workers.

6 SOCIAL DEVELOPMENT FRAMEWORK AND IEC FRAMEWORK

6.1 Social Development Framework

The project's Social Development Program stems mainly from the proponent's need to responsibly mitigate the anticipated negative social impacts of the project such as:

a) Physical and economic displacement of property owners and their families from their real property which is needed to make way for the planned mass transit infrastructure system

b) Physical and economic displacement of renters/ business owners and their dependents from their business location and livelihood as a result of ROW acqusition for the project

c) Physical and economic displacement of stall owners in the wet and dry market as a result of land acquisition for the project

d) Loss of livelihood of workers and staff from the displaced and disrupted businesses as a result of ROW acquisition for the project

e) Loss of parking terminal of tricycle drivers as a result ot ROW acquisition.

The SDP can also provide opportunities for the promotion of tourism in the host cities.

The recommended components of the SDP are as follows:

a) A series of IEC sessions and/or face-to-face meetings with the affected real property owners, renters/business owners, affected workers and staff of the affected businesses, affected stall owners in the affected wet markets to: i) brief them about the project and its significance; ii) to impress upon them the proponent's sincerity to abide by its obligations to Project-affected Persons; iii) to inform them about pertinent provisions of RA 10752 (The Right of Way Acquisition Act), especially the modes of acquiring private party and those pertaining to valuation and pricing; and iv) the proponent's intent to extend add-on social amelioration assistance to all those adversely affected by the ROW acquisition.

b) Formulation of a menu of social amelioration assistance packages according to type of displaced parties, such as damage or disturbance compensation to affected business owners, compensation to affected workers for their temporary loss of livelihood, setting up of a fund for no or low interest short term loans (one year) for displaced stall owners in the wet market, from which they can borrow the needed three-month down payment to enable them to transfer to the neighboring Suki market

c) Granting preferential employment in the project (during construction and operational stages) for qualified ROW acquisition-affected parties. If not yet fully capable, the proponent can perhaps finance their trainings under TESDA or under the training programs of existing LRT companies like LRT Linea 1 & 2.

d) Inclusion in the infrastructure design allocated business spaces for micro-business and granting them first priority in accessing a business space and extending to them subsidized rental scheme for those affected by ROW acquisition

e) Finding an alternative space to serve as terminal for tricycles and other vehicles in lieu of the terminal to be subjected to ROW acquisition.

An SDP Team should be organized by the proponent to specifically see through the planning, implemenation and monitoring of the above.

6.2 IEC Framework

An IEC program at this point is necessary given the following factors:

a) Low information level about the LRT Line 6 project, as many who said they know about LRT Line 6 might still be referring to the old alignment along Aguinaldo Highway under a different project proponent

b) The low social acceptability of the project among those who may be affected by ROW acquisition for the project. The big chunk of those who answered “cannot decide” or “don’t know,” can still be convinced to accept and allow the project to proceed.

c) Low information level about the project proponent, its vision and mission, guiding principles, and track record,

d) Lack of knowledge about the Right of Way Act, and the corresponding rights and entitlements of affected real property owners so that they can have a basis for negotiation with the proponent.

e) The need for LGUs to be regularly updated about the project and its details, including the final alignment, design specifications so that necessary road widening can be coordinated, project-affected parties (so that LGUs can help in facilitating the negotiations with real property and business owners), work schedules within their jurisdiction so that on-time traffic management measures can be instituted.

f) LGUs have strict solid waste management policies that the project proponent and its contractors need to abide with.

The above require that different IEC packages be designed according to current and emerging needs of the parties (including host LGUs) needing the IEC.

The SDP team can double up as the IEC team to ensure that the various IEC requirements are fufilled.

The summary matrix of the SDP and IEC Framework is presented in **Table 6-1** and **Table 6-2**, respectively.

Table 6-6-1. SDP Framework/Plan for LRT Line 6 Project

Component	Persons/Agencies Involved	Target Group/Beneficiaries	Timeline	Source of Funds
Confidence Building Measures for Potentially-affected Real Property Owners, Business Owners, affected workers/staff, and stall holders				
Courtesy Visits to Potentially-affected parties	Proponent's SDP/Comrel Unit	Potentially-affected real property owners and business owners, stall holders, workers/staff of affected businesses	Pre-Construction After obtaining the ECC and other permits when there is certainty that the project will push through	Proponent
Official meetings with Potentially -affected parties	Proponent and Host Local Government Unit (Representtives from the Mayor's office, City Assessor, CPDO, City Engineer, Host Barangay LGU)	Potentially-affected real property owners, stall holders, workers/staff of affected businesses	Pre- Construction After obtaining the ECC and other permits when there is certainty that the project will push through	Proponent
Social Amelioration Measures				
Commissioned Study on Social Amelioration Measures for Project-affected Parties	Proponent-engaged Social Research Unit or Proponent's SDP Team, Host LGUs	Project-affected parties in host LGUs	Pre-Construction	Proponent
Disturbance Compensation for Loss of Business Space	Proponent and Host LGU representatives	Potentially-affected micro-business owners and Stall Holders	Pre-Construction	Proponent
Disturbance Compensation for Loss of Wages	Proponent and Host LGU representatives	Potentially-affected workers/staff from affected micro-businesses	Pre-Construction	Proponent
Zero or Low Interest Emergency Loan Faciity	Proponent, Host LGU representatives, Appropriate NGO or financial institution	Potentially-affected micro business owners, stall holders, workers/staff	Pre-Construction	Proponent and Appropriate NGO of financial institution
Preferential Employment for Displaced Business Owners, Workers and Staff	Proponent, Host LGU, Employment Office	Potentially-affected micro-business owners, workers, staff	Pre-Construction Prior to Operation	Proponent and chosen contractors
Education and Training Scholarships for Future Employment in the LRT Line 6	Proponent, TESDA, in coordination with LRT2 Training Program	Selected Senior High School Graduates from Host LGUs aiming to work in LRT Line 6	Pre Construction Regular Program	Proponent
Livelihood Restoration/ Generation				
Provision of Affordable Business Space for Micro-businesses in Appropriate Places in the LRT Station 6 Structure	Proponent	Project-affected micro-business owners; other micro-businesses from the Host LGUs	Operational Stage	Proponent
Alternative Location for Tricycle Terminal	Proponent and Host LGU (Las Pinas)	Project-affected tricycle drivers and operators	Pre-Construction	Proponent
Promotion of Tourism Industry in Host Cities				
Provision of Space for Tourism Promotional Booths and Exhibit Areas in appropriate sections of the LRT Line 3 structure	Proponent, Tourism offices of Host LGUs, Department of Tourism	Tour Operators, Tourism Facility Oufits, Tourism Industries in the Host Cities	Operational Stage	Proponent, Department of Tourism, Host LGUs, Private Sponsors

Table 6-1-2. IEC Plan for LRT Line 6 Project

Sector/Group for IEC	IEC Topics	IEC Scheme/Strategy	Indicative Timeline	Indicative Cost
Host Barangay Councils Host City Mayors and key officials (City Engineer, Assessor, Planning, Traffic Management Unit etc.) Host City Councils Provincial Officials	Project Description and Timeline Land cquisition schemes and RA 10752 Presentation of salient points of the ECC Social Development and IEC Plans	Official letter from Proponent with attachments Meetings/Project presentations Periodic Visit to update LGU officials	After the ECC issuance prior to site development and construction Twice a year or according to project milestones	Food for Participants (Php300,000 per year)
Potentially-affected real property owners, stall owners, renters/business owners, staff, workers; and designated representatives from the City and Barangay LGUs	Project Description and Timeline Land acquisition schemes and RA 10752 Presentation of salient points of the ECC Social Development Plan especially social amelioration measures, livelihood restoration, credit/loan program	Official letter from Proponent One day conference	After ECC issuance and prior to Land acquisition	Venue Rental Food for participants Honoraria for workers/staff to replace income for the day. (Php350,000)
Barangay Officials and concerned City Officials	Available Job Opportunities Available Pre-job Trainings Scholarships for LRT Line 6 related jobs	Letter from Proponent and SDP Team Meeting Posters	After ECC Issuance and prior to construction	Food for Participants Posters LRT Line 6 Website (Php150,000)
Sub-contractors for the site development and construction stages Workers	Salient Points of the Environmental Management Plan and Pertinent points of the ECC Brief orientation on the Solid Waste and Liquid Waste Management Policies of the Host Cities	This can be integrated in the General HSSE Orientation. Power point presentations need to be prepared. Posters on Dos and Don'ts and Reminders on Proper Solid and Liquid Waste Management are needed.	Prior to start of Site Development Prior to start of construction of segments per City.	Food for short seminar Printing of Posters (Php150,000)

7 ENVIRONMENTAL COMPLIANCE MONITORING

7.1 Self-Monitoring Plan

The proponent will be required to conduct regular self monitoring during the construction phase. The proponent through its contractor will be required to submit quarterly Self Monitoring Reports (SMR) to the DENR EMB Regional Office. The summary of the Self-Monitoring Plan according to Annex 2-20 of the Revised Procedural Manual is provided below.

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
CONSTRUCTION PHASE													
Land Component (Geology and Soils)	Construction activities can lead to soil erosion	Silty runoff / brownish discharge	Visual observation	Daily	Active construction areas and creeks receiving discharge from construction areas	PCO	Salary part of project cost						
Land Component (Terrestrial Flora)	Seeds and seedlings of removed plants should be grown in nursery for future planting	Survival/ growth of transplanted seedlings	Observations in the seedling nursery	Monthly	Seedling nursery	PCO	Salary part of project cost						
Land Component (Terrestrial Fauna)	Construction activities can impact wildlife communities	Major vertebrate groups (birds, bats, mammals, amphibians and reptiles)	Transects and opportunistic observations	Semi-annually	Transects and sampling sites established during environmental impact study	Wildlife biologist	Pho200,000						
Water Component (Surface Water Quality	Construction activities can affect water quality	BOD	Grab sampling for laboratory analysis	Quarterly	Same stations used for EIA study	PCO	Php2,000	0.8 mg/L	0.9 mg/L	1 mg/L	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Construction activities can affect water quality	DO	Grab sampling for laboratory analysis	Quarterly	Same stations used for EIA study	PCO	Php2,000	4 mg/L	4.5 mg/L	5 mg/L	None	Implement corrective action	Find and fix source of contamination

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
Water Component (Surface Water Quality	Construction activities can affect water quality	Fecal coliform	Grab sampling for laboratory analysis	Quarterly	Same stations used for EIA study	PCO	Php2,000	0.88 mg/L	0.99 mg/L	<1.1 MPN/ 100mL	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Construction activities can affect water quality	Nitrate as NO_3	Grab sampling for laboratory analysis	Quarterly	Same stations used for EIA study	PCO	Php1,000	5.6 mg/L	6.3 mg/L	7 mg/L	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Construction activities can affect water quality	pH	Grab sampling for laboratory analysis	Quarterly	Same stations used for EIA study	PCO	Php500	6.8 mg/L	7.65 mg/L	8.5	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Construction activities can affect water quality	Phosphate	Grab sampling for laboratory analysis	Quarterly	Same stations used for EIA study	PCO	Php1,000	0.0024 mg/L	0.0027 mg/L	<0.003 mg/L	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface and Marine Water Quality	Construction activities can affect water quality	Temperature	Grab sampling for laboratory analysis	Quarterly	Same stations used for EIA study	PCO	Php500	24^0C	27^0C	30^0C	None	Implement corrective action	Find and fix source of temperature increase
Water Component (Surface Water Quality	Construction activities can affect water quality	Total suspended solids	Grab sampling for laboratory analysis	Quarterly	Same stations used for EIA study	PCO	Php1,000	20 mg/L	22.5 mg/L	25 mg/L	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Construction activities can affect water quality	Oil and grease	Grab sampling for laboratory analysis	Quarterly	Same stations used for EIA study	PCO	Php2,000	<0.8 mg/L	<0.9 mg/L	<1 mg/L	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Construction activities can affect water quality	Chromium	Grab sampling for laboratory analysis	Quarterly	Same stations used for EIA study	PCO	Php2,000	0.008 mg/L	0.009 mg/L	0.01 mg/L	None	Implement corrective action	Find and fix source of contamination
Air Component (Air Quality)	Construction activities will impact air quality	TSP	Ambient air quality sampling (24hr)	Quarterly or as required	Stations established for EIA study	Environmental Laboratory	Php600,000	240 ug	270 ug	300 ugr	None	Implement corrective action	Find and fix source of contamination

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
Air Component (Air Quality)	Construction activities will impact air quality	NO_2	Ambient air quality sampling	Quarterly or as required	Stations established for EIA study	Environmental Laboratory		272 ug	306 ug	340 ug	None	Implement corrective action	Find and fix source of contamination
Air Component (Air Quality)	Construction activities will impact air quality	SO_2	Ambient air quality sampling	Quarterly or as required	Stations established for EIA study	Environmental Laboratory		208 ug	234 ug	260 ug	None	Implement corrective action	Find and fix source of contamination
Air Component (Air Quality)	Construction activities will impact air quality	PM_{10}	Ambient air quality sampling (24hr)	Quarterly	Stations established for EIA study	Environmental Laboratory					None	Implement corrective action	Find and fix source of contamination
Air Component (Noise)	Construction activities will create noise	Noise levels	Ambient noise level monitoring (24 hr)	Quarterly	Stations established for EIA study	Environmental Laboratory					None	Implement corrective action	Find and fix source of contamination
People Component	Construction activities will generate employment	Number of local workers hired	Inspection of contractor records	Semi-annually	Construction site	PCO	Salary part of project cost						
OPERATION PHASE													
Water Component (Surface Water Quality	Project activities can affect water quality	BOD	Grab sampling for laboratory analysis	Semi-Annually	Same stations used for EIA study	PCO	Php4,000	0.8 mg/L	0.9 mg/L	1 mg/L	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Project activities can affect water quality	DO	Grab sampling for laboratory analysis	Semi-Annually	Same stations used for EIA study	PCO	Php4,000	4 mg/L	4.5 mg/L	5 mg/L	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Project activities can affect water quality	Fecal coliform	Grab sampling for laboratory analysis	Semi-Annually	Same stations used for EIA study	PCO	Php4,000	0.88 mg/L	0.99 mg/L	<1.1 MPN/ 100mL	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Project activities can affect water quality	Nitrate as NO_3	Grab sampling for laboratory analysis	Semi-Annually	Same stations used for EIA study	PCO	Php2,000	5.6 mg/L	6.3 mg/L	7 mg/L	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Project activities can affect water quality	pH	Grab sampling for laboratory analysis	Semi-Annually	Same stations used for EIA study	PCO	Php1,000	6.8 mg/L	7.65 mg/L	8.5	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Project activities can affect water quality	Phosphate	Grab sampling for laboratory analysis	Semi-Annually	Same stations used for EIA study	PCO	Php2,000	0.0024 mg/L	0.0027 mg/L	<0.003 mg/L	None	Implement corrective action	Find and fix source of contamination

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
Water Component (Surface Water Quality	Project activities can affect water quality	Temperature	Grab sampling for laboratory analysis	Semi-Annually	Same stations used for EIA study	PCO	Php1,000	24^0C	27^0C	30^0C	None	Implement corrective action	Find and fix source of temperature increase
Water Component (Surface Water Quality	Project activities can affect water quality	Total suspended solids	Grab sampling for laboratory analysis	Semi-Annually	Same stations used for EIA study	PCO	Php2,000	20 mg/L	22.5 mg/L	25 mg/L	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Project activities can affect water quality	Oil and grease	Grab sampling for laboratory analysis	Semi-Annually	Same stations used for EIA study	PCO	Php4,000	<0.8 mg/L	<0.9 mg/L	<1 mg/L	None	Implement corrective action	Find and fix source of contamination
Water Component (Surface Water Quality	Project activities can affect water quality	Chromium	Grab sampling for laboratory analysis	Semi-Annually	Same stations used for EIA study	PCO	Php4,000	0.008 mg/L	0.009 mg/L	0.01 mg/L	None	Implement corrective action	Find and fix source of contamination
Air Component (Noise)	Project operation will increase noise levels	Noise levels	Ambient noise level monitoring (24hr)	Quarterly	Stations established for EIA study	Environmental Laboratory	Php400,000						
People Component	Project operation will generate employment opportunities	Number of local staff hired	Inspection of HR records	Annual	Resort	PCO	Salary part of operating cost						
People Component	PAVI will implement social development programs	Types and number of social development programs	Inspection of SDP programs	Annually	Host barangays and LGUs	PCO and LGU	Part of operating cost						

7.2 Multi-sectoral Monitoring Framework

As discussed in DENR Administrative Order No. 2003-30 or the Revised Procedural Manual for the Philippine EIS System, multi-partite monitoring teams (MMTs) are organized to encourage public participation, promote greater stakeholder vigilance, and provide an appropriate check and balance mechanisms in the monitoring of project implementation. Only environmentally critical projects are required to form an MMT as discussed in DAO 2017-15.

After ECC issuance, the proponent will initiate the formation of the MMT. A Memorandum of Agreement (MOA) between the EMB CO and proponent will be executed with the conformity of the MMT members. A Manual of Operations (MOO) shall then be formulated to guide the MMT in planning its activities, operationalizing its functions and managing its performance. The MOO should contain the following:

- Membership – selection process, code of ethics, suspension/removal, resignation/replacement process
- Organization – structure, leadership, roles, and responsibilities
- Fund administration and management
- Activities – meetings, monitoring activities, records keeping, public disclosure, operations, and performance enhancement

According to DAO 2017-15, MMTs shall be organized only for environmentally critical project. Since the proposed project is an ECP, it will be required to form an MMT at least for the construction phase. MMT operation during the operation phase may not be necessary considering that the project will have minimal negative and mostly positive environmental impacts when the railway project is operational. Continuation of MMT activities during the operation phase will be determined by DENR and the Project Proponent prior to commencement of project operation.

The proposed composition of the MMT for this project is listed below.

- LGU representatives
    - One each from the MENRO/City ENRO and Provincial ENRO of host LGUs (i.e., Las Piñas, Parañaque, Muntinlupa, Bacoor and Dasmariñas cities); in cases where these positions are not available, representative will come from the MPDO/CPDO or the chairman of the committee on environment of the Sangguniang Bayan/Panlungsod
    - Rural health unit chief
    - Concerned barangay captain/s
- One representative from LGU-accredited local NGOs with missions related to environmental management and/or type of impacts of the proposed project
- Maximum of two representatives from locally recognized community leaders who can represent the vulnerable sectors including indigenous peoples, women and senior citizens, and representatives from the academe
- Maximum of three representatives from government agencies with similar mandate on project type and its impacts during project implementation (e.g. DOTr, MMDA, etc.); DENR shall be included only when there are specific concerns related to biodiversity and forestry

The project proponent and EMB DENR shall no longer be a member of the MMT. The EMB DENR will provide oversight guidance to the MMT and consider the MMT reports and recommendations in the compliance evaluation. It shall also conduct a regular performance audit of the MMT activities based on the Annual Work and Financial Plan approved by the EMB.

The MMT shall not exceed ten members except in cases where the location of project facilities cover more than one barangay and/or city or municipality.

As a general rule, the MENRO/City ENRO representative or the representative from the lead government agency will serve as the MMT chair. In cases when the said representatives do not accept the MMT chairmanship, the members shall elect a chairman among themselves as specified in its Manual of Operations.

The responsibilities of the MMT include:

- Conduct a quarterly ocular site visit to validate the proponent's compliance with the ECC conditions and the Environmental Management and Monitoring Plan including the requirement for self-monitoring and submit corresponding reports regularly. The MMT may observe the sampling activities conducted by the project proponent.
- Prepare and submit the MMT report to the EMB CO and concerned EMB Regional Office using the prescribed format at least semi-annually not later than July 30 for the first-semester report and January 30 of the following year for the second-semester report.
- Institute an environmental emergency and complaints receiving and management mechanism, including systems for transmitting recommendations for necessary regulatory action to EMB in a timely manner to prevent adverse environmental impacts.

During the quarterly site visit, the MMT shall implement the usual procedures including a closing meeting where MMT findings will be discussed in the presence of a proponent representative.

7.3 Environmental Guarantee and Monitoring Fund Commitments

The proponent shall provide environmental monitoring fund (EMF), the amount of which shall be based on the annual work and financial plan to be approved by the EMB. The EMF administration and management shall be prescribed in the MOO and should contain the following provisions:

- Eligible expenses and standards
- Preparation and approval of work and financial plan for the establishment of the EMF amount
- Management of fund
- Disbursement and auditing procedures

The mode of fund administration shall be decided by the project proponent in consultation with the MMT considering the MMT's independence. The fund administrator shall accept the fund administration and management responsibilities as discussed in the MOO and shall be liable for any misapplication or inappropriate disbursements allowed to be charged against the EMF.

The fund administrator shall open an account with a government accredited bank, with the elected chairperson or treasurer of the MMT as signatory and the representative of the fund administrator as counter signatory.

The proponent shall release the amount of the funds based on the EMB approved annual work and financial plan initially equivalent to projected expenses for the first three quarters. Succeeding releases will be done semi-annually upon liquidating the expenses and validation of the submission of MMT report to EMB for the previous reporting period. The proponent shall conduct a regular audit of the EMF and apprise EMB on irregularities if any.

MMT members especially those who will lose their opportunity to earn while participating in MMT activities will receive an honorarium of not more than PHP2,000 per quarter for their participation charged to the EMF. A contingency of not more than 50% of the total amount allotted for honoraria and for logistical expenses for regular activities maybe allotted such as for emergency meetings, capability building, and other related activities.

Environmental Guarantee Fund

An Environmental Guarantee Fund (EGF) is required to be established for projects that have been determined by DENR to pose a significant public risk or where the project requires rehabilitation or restoration. The EGF will be used for the rehabilitation and restoration measures as well as implement damage prevention measures, environmental education, scientific or research studies, IEC, training on environmental risk or environmental accident-related matters.

EMB considers the following conditions to pose a significant public risk:

- Presence of toxic chemicals and hazardous wastes as defined in RA 6969
- Extraction of natural resources that requires rehabilitation or restoration
- Presence of structures that could endanger life, property, and the environment in case of failure
- Presence of processes that may pose a significant pollution risk as defined under pollution laws

According to DAO 2003-30, the EGF shall be used for the following risk management purposes:

- Immediate rehabilitation of areas affected by damage to the environment and the resulting deterioration of environmental quality as a direct consequence of project construction, operation, and abandonment;
- Just compensation of parties and communities affected by the negative impacts of the project;
- Conduct of scientific or research studies that will aid in the prevention or rehabilitation of accidents and/or risk related environmental damages; or
- Contingency clean up activities, environmental enhancement measures, damage prevention program including the necessary IEC and capability building activities to significantly minimize or buffer environmental risk related impacts

The amount to be allocated for the EGF shall be determined through negotiations between the proponent and EMB-DENR and should take into consideration the following: (1) EIS committed programs; (2) degree of environmental risk involved; (3) valuation of resources that would most likely be affected; and (4) proponent's ability to provide funds for the EGF. In case the funds in the EGF are not sufficient to pay for compensable damage claims, the proponent shall provide additional funds to cover the cost of rehabilitation, restoration or other activities for which the EGF was established. The proponent shall replenish the EGF whenever the amount falls below 50% of the agreed initial amount.

Sufficient amount should be left from the EGF at the end of the project life to ensure that rehabilitation, restoration, decommissioning or abandonment shall be adequately financed. The amount may be adjusted to cover inflation and other factors. The proponent's submission of the Project Abandonment Plan shall have the corresponding find commitment subject to the approval of DENR or the lead government agency.

The EGF shall have two major components, the trust fund, and environmental guarantee cash fund. The trust fund will be in the form of a guarantee instrument and will be used to compensate aggrieved parties for any damages to life or property, undertake community-based environmental programs, conduct environmental research aimed at strengthening measures to prevent environmental damage and finance restoration and rehabilitation of environmental quality caused by the project. The trust fund can be in the form of insurance, letters of credit, trust fund, other financial instruments, and other similar guarantee instruments. Surety or performance bonds will not be accepted unless warranted by extreme circumstances.

The Environmental Guarantee Cash Fund will be earmarked for the immediate rehabilitation and compensation of affected communities in case of damage or accidents. It shall be used to cover administrative costs of managing the fund by the MMT-authorized fund manager. Part of the fund for emergency response may be placed in a government bank guarantee that can be withdrawn within 24 hours while the rest of the cash fund will be deposited in an interest-bearing account, the interest of which will accrue to the cash fund. The funds shall be replenished when it reaches a certain level agreed upon by the MMT and should not be lower than 50% of the original amount.

The EGF will be established through the preparation of a MOA containing the following agreements:

- Specific amount of fund to be set up and in what form
- Mode of distribution, allocation, and disbursement of funds
- Terms of reference for fund operationalization with respect to the implementation of environmental programs
- Terms and conditions for the payment of relevant parties

For this project, the EGF Trust Fund will be in the form of a Contractor's All Risk Insurance (CARI), a non-standard insurance policy that provides coverage for property damage and third party injury or damage claims. Damage to property can include improper construction of structures, damage during renovation, and damage to temporary work erected onsite. Third parties include subcontractors who may be injured while working at the construction site. CARI insurance coverage is common for construction projects such as buildings, flyovers, airports and other infrastructure projects.

The proposed initial amount of the EGF Cash Fund is Php500,000 but the amount will be adjusted depending on the requirements of the project.

A Fund Management Committee or the EGF Committee shall be established to manage the EGF Trust Fund and EGF Cash Fund. The EGF Committee shall:

- Manage, control and operate the EGF in accordance with agreed internal procedures established regarding the mechanisms for fund disbursement, processing, validation, accounting, and documentation.
- Resolve issues involving rehabilitation and compensation for damages that may be brought before it.
- Decide issues on complaints/ questions involving the implementation of the rehabilitation program between the proponent and the aggrieved party.
- Designate entities or individuals in the event that an independent body must resolve the issues and cases.
- Hire credible experts to conduct independent studies and research on the environmental and socio-cultural impacts of the project in order to assist the EGF committee in making judicious decisions about environmental issues related to the project.
- Undertake damage control or preventive measures.

Claims to the EGF shall be classified whether emergency, compensatory and/or operating expenses.

Emergency claims include (1) prevention of loss of life or serious damage to property and environment; (2) immediate rehabilitation of affected areas; (3) provision of immediate corrective action against the spread of accident or disaster; and (4) evacuation and temporary relocation of affected residents. The causes of emergency claims should be due to pollution and/or environmental degradation arising from project activities or violations of environmental laws and regulations. Failure of the proponent to comply with obligations set forth in the EIS and ECC is another ground for an emergency claim.

Compensatory claim is intended to pay for pecuniary loss or damage suffered by a party, person or entity as a consequence of the project. The EGF committee should come out with guidelines on how to access the EGF for compensatory claims. The guidelines should specify the procedures for filing a claim for compensatory damages, require proof or evidence to support the claim for compensation, and basis of computation of compensatory damages.

Claim for operating costs should support the operations of the EGF committee. The EMF guidelines on allowable expenses shall be adopted for use by the EGF committee. Claim for operating expenses shall include costs of preventive activities, environmental education, scientific or research studies, training and other activities duly provided for in the MOA or as approved by the EGF committee.

Complaints or claims must be filed with the EMB Regional Office with accompanying evidence within one month after damages have occurred, after which no complaints may be entertained. Written complaints or claims must be filed with accompanying evidence and are subject to verification and certification by the EMB Regional Office. The claimant's request for compensations must include the evidence of livelihood source, evidence of ownership or stewardship and location of the property and nature/extent of damages based on an assessment by the claimant. The Proponent shall exercise due diligence and prudence in validating and assessing compensation for such claims. The EGF committee shall affirm such validation taking into consideration issues on social equity, health, opportunity costs, and other factors. Field investigation or evaluation may be done by the EGF committee or DENR if necessary. All claims that have been approved by the EGF committee and certified by the EMB should be paid to the claimant within 30 days after receipt of notice by the proponent.

8 ABANDONMENT/DECOMMISSIONING/REHABILITATION POLICIES AND GENERIC GUIDELINES

Should the project be abandoned at any time during any of the project phases, the proponent shall prepare an abandonment plan with the objective of rehabilitating the site to its pre-construction state. The Abandonment Plan will be developed prior to the cessation of activities and will be submitted to DENR as stipulated in the ECC. The contents of the Abandonment Plan will include the following (after JICA 2018):

- Proposed abandonment/decommissioning measures for project facilities
- Removal of hazardous and non-hazardous wastes from the project sites
- Site restoration when feasible
- Cost of abandonment/decommissioning/rehabilitation activities and source of funds to implement these activities

The abandonment will commence with the securing of appropriate permits from DENR and the LGU. Materials removed from the site shall be managed according to the use, type, and waste category. Recyclable and reusable materials shall be collected and sold or transferred to other areas while non-recyclable and residual materials will be brought to a government-approved final disposal site.

The Abandonment/Decommissioning Plan will be developed by the Project Proponent in coordination with DOTr and DENR. The Proponent will inform the DOTr at least six months prior to abandonment and the plan will be communicated to DENR for review and approval prior to the commencement of abandonment/decommissioning activities. The Proponent will also inform the affected LGUs and communities prior to abandonment/ decommissioning.

The DOTr and the Proponent will oversee the implementation of decommissioning activities, which will be properly documented through photographs of decommissioning areas and decommissioning reports.

Upon the completion of the abandonment/decommissioning activities, DOTr and the Proponent will submit a report to DENR informing them about the completion of decommissioning activities. DENR will review the report and inform DENR about its findings. It may also conduct site inspections together with the MMT. If irreversible damages are discoved during the site inspections, the extent of the damage will be investigated and if found to be construction-related, the CARI will be tapped for compensation of damages. If damages are caused by train maintenance and operations, compensation for damages will be taken from the EGF.

Demobilization after the construction phase

Demobilization will occur upon completion of the construction activities and the railway infrastructure is deemed fit for operation. Demobilization will include activities and costs for the transportation of personnel, equipment and supplies from the construction site. Activities will include disassembly, removal and site cleanup of offices and other temporary structures assembled at the construction sites. A detailed list of demobilization activities is provided below[74]:

- Decontaminate the site (if necessary) and remove all materials and equipment brought to the site
- Clear site of all debris and thoroughly sweep all paved areas
- Remove any temporary fencing installed during construction
- Repair any damages to fences, buildings, streets, parking lots, curbs, landscaping and other property
- Decontaminate all equipment, vehicles and other items prior to removal from the site

[74] https://www.sanbruno.ca.gov/civicax/filebank/blobdload.aspx?BlobID=23350

9 INSTITUTIONAL PLAN FOR EMP IMPLEMENTATION

The implementation of the EMP and EMoP will be the primary responsibility of PAVI as the project proponent. PAVI will designate a Pollution Control Officer who will oversee the implementation of the EMP and EMoP during the construction and operation phases. PAVI will ensure that the General Contractor and subcontractors will follow the EMP for construction through inclusion of conditions in the contract.

DOTr as implementing agency will oversee the activities conducted during project construction and operation. It will ensure that PAVI will comply with all applicable environmental laws during all project phases.

EMB as the regulatory agency will enforce all environmental regulations and monitor the project's compliance to ECC conditions. The MMT will be an independent entity that will be formed after ECC issuance and it will monitor the project's compliance to ECC conditions as well as the EMP and EMoP during construction and operation.

The institutional plan for EMP implementation is summarized in **Table 9-1**. The persons and agencies responsible for environmental management during the construction and operation phases are identified in the matrix while the organizational chart is presented in **Figure 9-1**.

Table 9-1. Institutional Plan for EMP Implementation.

Institution	Roles and Responsibilities
PAVI	PAVI/LRT6 Operator will ensure that funds will be available for the construction of the project and for the implementation of the environmental management plan during the construction and operation phases. It will designate a PCO during the construction phase to take charge of the implementation of the environmental management and monitoring plans and submission of compliance and self-monitoring reports to DENR.
DOTr	The DOTr as the implementing government agency will oversee the activities that will be implemented by PAVI, the project proponent. DOTr will ensure that PAVI will implement the EMP and EMoP and will provide the corresponding budget requirements for the efficient implementation of the environmental management and monitoring plans.
General Contractor	The Contractor will have the overall responsibility in the implementation of the EMP during the construction phase. It shall be responsible for regular reporting of compliance monitoring and self-monitoring to EMB Region IV-A and/or EMB-NCR. The Contractor will designate a PCO in accordance with existing DENR guidelines. The PCO will monitor the Contractor's compliance with environmental management and monitoring plans during the construction phase.
EMB Region IV-A and EMB-NCR	EMB Region IV-B and EMB-NCR will be responsible for enforcing the environmental regulations and in monitoring PAVI's compliance with the ECC conditions.
Host LGUs and other Project Stakeholders (MMT	The host LGUs (Parañaque, Las Piñas, Muntinlupa, Bacoor, and Dasmariñas) will monitor PAVI's compliance to the environmental management and monitoring plans and will work with PAVI on the implementation of the social development programs of the project.

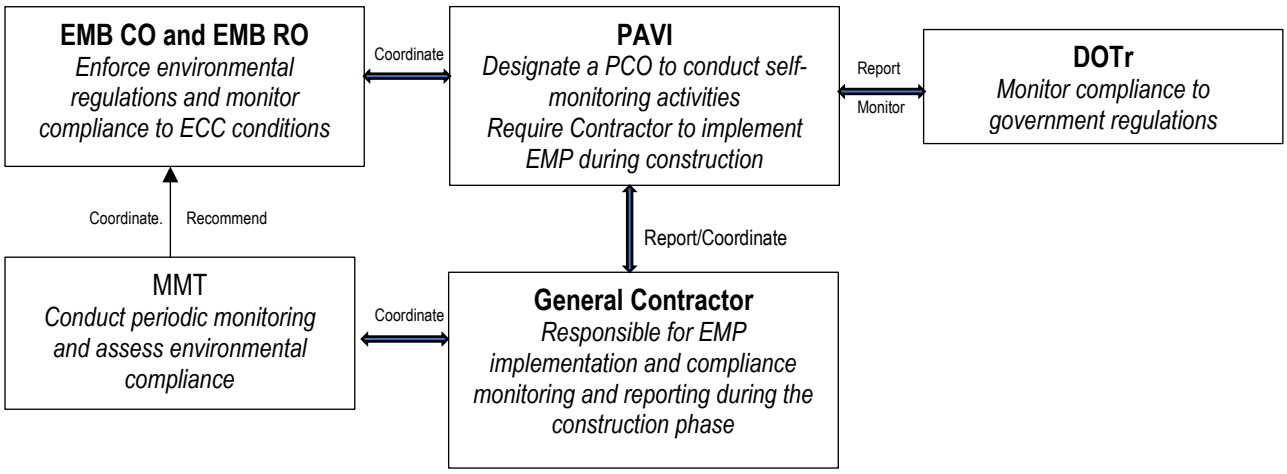


Figure 9-1. Simplified Institutional Plan for EMP Implementation (after JICA 2018)

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APPENDIX 1. PAVI LETTER TO DOTR ON UNSOLICITED PROPOSAL FOR MODIFIED LRT -6

PRIME ASSET VENTURES, INC.

DOTC GSD-RECORDS SECTION RECEIVED JAN 20 2017 TIME: 2:00

Office of the President Date F-20 Time 9:48 ARE17052467 Received by

13 January, 2017

Office of the Secretary
DEPARTMENT OF TRANSPORTATION
17/F Columbia Towers
Ortigas Avenue, Mandaluyong City

NEDA
Office of the Secretary
Received By: Chris Sales
Date & Time: 1/20/17
Reference No:

Attention: **Hon. Sec. Arthur P. Tugade**
Secretary

Re: **Unsolicited Proposal for Modified Light Rail Transit-6**
Phase-1 : Niog to Dasmarinas City (21.4 km)
Phase-2 : Dasmarinas City to Tagaytay City (20.6km)

Honorable Secretary Tugade:

We respectfully submit to the Department of Transportation (DOTr) the attached Unsolicited Proposal for the Development of the 42km Light Rail Transit (modified LRT-6) under the Build-Operate-Transfer scheme along Molino-Paliparan (Phase-1) and Aguinaldo Highway (Phase-2).

Prime Asset Ventures Inc. together with its local and international consortium members (hereinafter referred to as PAVI Consortium) proposes to undertake the design, financing, construction, operation and maintenance of the modified LRT-6 project with the following proposed stations. This Line-6 effectively connects the Metro's far north of Monumento to Tagaytay City (72-km) with just an hour and a half travel time by rail.

Niog Interchange
Bacoor City Hall Station
San Nicolas Station
Daang Hari Station
Evia Station
San Pedro Station
De La Salle Station
Island Park Station
Governor's Drive Station
Silang Station
Tagaytay Station

Notably, the superseded LRT6 along the narrow Aguinaldo Highway is not suitable for rail & stations due to limited right-of-way width and constricted with high-voltage transmission lines. Whereas, the modified LRT-6 right-of-way is proposed to be aligned

UGF, Worldwide Corporate Center, Brgy. Highway Hills, Shaw Blvd., Mandaluyong City/Tel No: 310-72-84

PRIME ASSET VENTURES, INC.

RECEIVED
SEP 18 2017
PPP Center of the Philippines

Office of the President
Date: 9-15 Time: 9:46
Received by

DOTC
OFFICE OF THE SECRETARY
RECEIVED
SEP 12 2017
BY: SHANIE R. COLLARDO
9:30AM

06 September, 2017

our ref: PAVI - AL-170906

SECRETARY ARTHUR P. TUGADE
Department of Transportation (DOTr)
17/F Columbia Towers
Ortigas Avenue, Mandaluyong City

Re: **Unsolicited Proposal for Modified Light Rail Transit-6**
Phase-1 : Niog to Dasmarinas City (22.68 km)
Phase-2 : Dasmarinas City to Tagaytay City (26km)

Dear Secretary Tugade:

In furtherance of the Unsolicited Proposal submitted by Prime Asset Ventures Inc. last 07 January 2017, we are respectfully transmitting the following documents to complete the Proposal under the Public Private Partnership modality.

1. Feasibility Study prepared by PAVI, JF Cancio, PMACs and TTPI.
   - Preliminaries and Ridership
   - Alignment, Profile and Stations (Volume 2)
   - Engineering Assessment and Operational Plan
   - Financial and Economic Analysis
   - PPP Feasibility and Value for Money Analysis

2. Environmental Study
   - Environmental Impact Assessment
   - Environmental Management Plan

3. Reference to Volume-2, 92% of the required right-of-way (ROW) for both alignment and depot will be made available by the Proponent, while the remaining 8% of the ROW can be worked out very shortly.

4. Establishment of an SPC (Special Purpose Corporation backed by consortium of EPC and an International Bank), which will be technically and financially capable to undertake the US$ 980 Million project (Modified LRT6 Phase-1) within five years.

1

APPENDIX 2. DOTR LETTER INFORMING PAVI ABOUT NEDA REQUIREMENTS

Republic of the Philippines
DEPARTMENT OF TRANSPORTATION

23 July 2018

MS. FE T. REBANCOS
Director and Treasurer
Prime Asset Ventures, Inc.
UGF, Worldwide Corporate Center
Brgy. Highway Hills, Shaw Blvd.
Mandaluyong City

Dear Director Rebancos:

This refers to your Unsolicited Proposal for the 23.5-km, Php 50,380 Million Modified LRT6 Project.

In a letter from NEDA dated 13 July 2018 (copy attached), the following documents were noted lacking and should be submitted:

- PE Form No. 9-Gender Responsiveness Checklist (Form attached)
- Two (2) sets of electronic copies of the economic and financial analyses in traceable formula format
- Environmental Impact Statement/Environmental Compliance Certificate/ Certificate of Non-Coverage
- Location map (with e-copy)
- ROW acquisition and resettlement action plan
- RDC endorsement (Prior to notice of award)

Your immediate response will expedite the NEDA evaluation and approval of the project.

Very truly yours,

RUBEN S. REINOSO, JR.
Undersecretary for Planning & Project Development

APPENDIX 3. ORIGINAL PROPONENT STATUS

Republic of the Philippines
DEPARTMENT OF TRANSPORTATION

22 June 2018

MS. FE T. REBANCOS
Director and Treasurer
Prime Asset Ventures, Inc.
UGF, Worldwide Corporate Center
Brgy. Highway Hills, Shaw Blvd.
Mandaluyong City

Subject: **Original Proponent Status (OPS) for the Modified LRT6 Project**

Dear Director Rebancos:

This refers to your Unsolicited Proposal for the 23.5-km, Php 50.38 Billion Modified LRT6 Project, the receipt of complete proposal of which was acknowledged by the Department on 08 January 2018.

After evaluation of your submitted legal, technical, and financial documents, we are now accepting your proposal and confer upon your company the **Original Proponent Status (OPS)** for the project, pursuant to Republic Act No. 7718 and its Implementing Rules and Regulations (IRR). We will subsequently endorse your proposal to the National Economic and Development Authority (NEDA) Board – Investment Coordination Committee (ICC) for its consideration/ approval and inform you of any developments thereafter.

Very truly yours,

ARTHUR P. TUGADE
Secretary

DOTr-DSEG OUTGOING

Cc: Sec. Carlos G. Dominguez, DOF
Sec. Ernesto M. Pernia, NEDA
Exec. Dir. Ferdinand A. Pecson, PPP-Center

APPENDIX 4. ACCOUNTABILITY STATEMENT OF PROJECT PROPONENT

ACCOUNTABILITY STATEMENT OF PROJECT PROPONENT

This is to certify that all the information and commitments in the Environmental Impact Statement (EIS) for the LRT Line-6A and Line-6B+C Project are accurate and complete to the best of our knowledge, and that an objective and thorough assessment was undertaken in accordance with the dictates of professional and reasonable judgement. Should I/we learn of any information, which would make this EIS inaccurate, I/we shall immediately bring the said information to the attention of DENR-EMB.

I hereby certify that the no DENR EMB personnel were directly involved in the preparation of this EIA Report for the LRT Line-6A and Line-6B+C Projectother than to provide procedural and technical advise consistent with the guidelines in the DAO 03-30 Revised Procedural Manual.

I hereby bind myself to answer any penalty that may be imposed arising from any misrepresentation or failure to state material information in this EIA Report.

In witness whereof, I hereby set my hand this 12 JUN 2019 day of _____ 2019 at _____, Philippines.

Tony Tan
Prime Asset Ventures, Inc.

SUBSCRIBED AND SWORN TO before me this 13 JUN 2019, affiant exhibiting his _____ No. _____ issued at _____ on _____.

Notary Public

Doc No. 186
Page No. 37
Book No. 117
Series of 2019

ATTY. ROGELIO J. BOLIVAR
NOTARY PUBLIC IN QUEZON CITY
AM Adm. Not. Com No. NP-174 1-12-19 Until 12-31-20
IBP O.R. No. 655255 Jan. 2019 PBP O.R. No. 655255 Jan
PTR O.R. No. 7376155C 1/7/19 Roll No. 33892 TIN No. 125-67
MCLE No. V-0019795 Valid From 04/14/2019 PASIG CITY
Address: 31 Harvard St. Cubao, Q.C

APPENDIX 5. ACCOUNTABILITY STATEMENT OF EIA PREPARERS

ACCOUNTABILITY STATEMENT OF EIA PREPARERS

This is to certify that all the information in this Environmental Impact Statement (EIS) for the LRT Line-6A and Line-6B+C Project are accurate and complete to the best of our knowledge, and that an objective and thorough assessment of the Project was undertaken in accordance with the dictates of professional and reasonable judgment. Should we learn of any information, which would make this EIS inaccurate, we shall immediately bring the said information to the attention of DENR-EMB NCR and Region IV-A Office.

We hereby certify that no DENR EMB personnel were directly involved in the preparation of this EIS for the LRT Line-6A and Line-6B+C Project other than to provide procedural and technical advice consistent with the guidelines in the DAO 03-30 Revised Procedural Manual.

We hereby bind ourselves jointly and solidarily to answer any penalty that may be imposed arising from any misrepresentation or failure to state material information in this EIS.

IN WITNESS WHEREOF, we hereby set our hands this 11th day of June 2019 at Quezon City, Philippines.

Name	Tax Identification No.	EIS Participation	Signature
Alvin Nacu	121-073-539	Team Leader	
Armie Jean Perez	200-457-962	Environment Specialist	
Arriane Tabanao		Geologist	
Jose Alan Castillo		Terrestrial Ecologist	
Daniel Torres	900-177-689	Wildlife Biologist	
Jethro Alden C. Hipe		Air Module Specialist	
Ma. Theresa Agravante	196-884-212	Socio-economist	
Randolph Carreon		Traffic Specialist	
Pedro Peralta, Jr.	470-288-099	GIS Specialist	

SUBSCRIBED AND SWORN TO before me this 13 JUN 2019, affiants exhibiting their Tax Identification No. as stated above.

WITNESS MY HAND SEAL on the place and date above written.

Doc No. 185
Page No. 37
Book No. II-A
Series of 2019

Notary Public
ATTY. ROGELIO J. BOLIVAR
NOTARY PUBLIC IN QUEZON CITY
Appt. Adm. Not. Com No. NP-124 1-12-19 Until 12-31-2020
IBP O.R. No. 055255 Jan. 2019 & IBP O.R. No. 055256 Jan. 2020
PTR O.R. No. 7376155C 1/7/19 Roll No. 33892/ TIN No. 129-871-000
MCLE No. V-0019296 Valid From 04/14/2019/ PASIG CITY
Address: 31 Harvard St. Cubao, Q.C

APPENDIX 6. PROOF OF CONDUCT OF IEC

Basic Project Information / Project Profile

The brief project profile is provided below while the Project Description for Scoping is attached as **Annex 1**.

Name of Project	**LRT Line-6 A and Line-6 B+C**
Project Location	Parañaque, Las Piñas and Muntinlupa Cities in Metro Manila and Bacoor and Dasmariñas Cities in Cavite Province
Nature of Project	New elevated railway system
Project Alignment	**LRT Line-6A**: commencing from Niog Station in Bacoor City to Governors Drive Station in Dasmariñas City with 8 stations and approximate length of 23.5 km. Alignment will traverse segments of Molino Boulevard, privately-controlled properties and segments of Molino-Paliparan Road **LRT Line-6B**: commencing from NAIA Terminal 1/Terminal 2 Station until San Nicolas Station in Bacoor City with 10 stations and approximate route length of 16 km. Alignment will traverse segments of Dr. A. Santos Avenue, A. Canaynay Avenue, CAA Road, Marcos Alvarez Ave., M. Alvarez Extension and Alabang-Zapote Road and will pass through privately-controlled properties. **LRT Line-6C**: commencing from Sucat Station until Lakefront Station with 6 stations and approximate length of 7.7 km. Alignment will traverse Dr. A. Santos Avenue. **Alabang Zapote LRT Line** with four stations and approximate length of 5 km from Marcos Alvarez Station in Las Piñas City to Star Mall Station in Muntinlupa City. Alignment will traverse Alabang-Zapote Road.
Proponent Profile	
Proponent's Name	Prime Asset Ventures, Inc.
Proponent's Address	UG/F Worldwide Corporate Center Highway Hills, Shaw Boulevard, Mandaluyong City
Authorized Representative	Engr. Antonio T. Tan (Planning Director)
Contact Details	02.226.3552 local 1041/ gecsmatt@yahoo.com

Information, Education and Communication Campaign

The information, education and communication (IEC) campaign and pre-scoping activities for the LRT Line-6A and Line-6B+C project was conducted from 24 October 2018 to 04 December 2018 in the five host cities (Parañaque, Las Piñas, Muntinlupa, Dasmariñas and Bacoor) and 35 host barangays (see **Table 1**). The IEC team consisted of personnel of Prime Asset Ventures, Inc. (PAVI) and three personnel from Seastems, Inc. (Alvin Nacu, Ma. Theresa Agravante and Armie Jean Perez), the environmental consultant for the application for Environmental Compliance Certification (ECC) of the LRT Line-6A and Line-6B+C project. The objectives of the IEC are to:

1. Inform the host city and barangay local government units (LGUs) and other identified stakeholders of the LRT Line-6A and Line-6B+C project;
2. Obtain preliminary perception/social acceptability data from selected stakeholder groups through key informant interviews and/or focus group discussions;
3. Validate the initial list of stakeholders who will participate in the city level public scoping meetings;
4. Determine the initial schedule of the city-level public scoping meetings and brief key host barangay officials on how they and their constituents can meaningfully participate in the project scoping activities; and
5. Collect secondary information relevant to the environmental study.

Table 10-1. List of Impact Barangays

Barangays	City		Barangays	City
Bayanan	Bacoor		BF International	Las Piñas
Ligas 2	Bacoor		Manuyo Dos	Las Piñas
Ligas 3	Bacoor		Pamplona Tres	Las Piñas
San Nicolas 1	Bacoor		Pulang Lupa Dos	Las Piñas
San Nicolas 2	Bacoor		Talon Uno	Las Piñas
San Nicolas 3	Bacoor		Talon Dos	Las Piñas
Molino 1	Bacoor		Talon Singko	Las Piñas
Molino 2	Bacoor		Ayala-Alabang	Muntinlupa
Molino 3	Bacoor		Alabang	Muntinlupa
Molino 4	Bacoor		Cupang	Muntinlupa
Molino 6	Bacoor		Sucat	Muntinlupa
Niog 3	Bacoor		BF Homes	Parañaque
Talaba 4	Bacoor		La Huerta	Parañaque
Paliparan 1	Dasmariñas		San Antonio	Parañaque
Paliparan 2	Dasmariñas		San Dionisio	Parañaque
Paliparan 3	Dasmariñas		San Isidro	Parañaque
Salawag	Dasmariñas		Sto. Niño	Parañaque
Almanza Uno	Las Piñas			

The stakeholder groups that may be potentially affected by the LRT Line-6A and Line-6B+C Project are:

- Host LGUs and related local government agencies in areas to be traversed by project alignment, which include three cities of Metro Manila and two cities of Cavite Province and a total of 35 host barangays;
- Government agencies with related mandate to the project, e.g., Department of Transportation (DOTr) and Metro Manila Development Authority (MMDA);
- Non-government organizations (NGOs) and people's organizations (POs) such as transport groups, business organizations, etc.;
- Affected property owners, business establishments and homeowners' associations; and
- Local institutions such as schools, hospitals, churches, etc.

During the IEC proper, officials and representatives of host cities and host barangays and concerned LGU department heads were provided copies of the project description and were presented with an A3-sized map of the project alignment. The consultant discussed the different alignments of LRT Line-6A and Line-6B+C and showed the LGU officials the project segments that will pass through their respective jurisdictions. The LGU officials were then asked to identify potential project stakeholders who may be affected during the pre-construction, construction and operation phases of the elevated railway project. This helped the consultants finalize the list of project stakeholders. The barangay officials were requested to invite the identified project stakeholders to participate in the city-level scoping meetings that were tentatively scheduled on the third week of January 2019.

The results of the IEC activities are summarized below while the summary of issues and concerns raised during the IEC activities are presented in **Table 2. Table 3** presents the tabulated list of issues and concerns of city and barangay officials visited from 24 October to 04 December 2018.

1. **Parañaque City**. The IEC Team was able to complete the coordination process on 24 and 25 October 2018 with the Office of the Mayor of Parañaque as well as the six impact barangays (San Antonio, San Dionisio, La Huerta, Sto. Niño, BF Homes and San Isidro) for the City-level Scoping Meeting. Upon consultation with Mayor Edwin Olivarez and the secretaries at the Office of the Mayor and Office of the City Administrator, the IEC activity for Parañaque City was initially scheduled on 27 November 2018 but was later re-scheduled on 16 January 2019, 1000H at the Mayor's Hall (2/F of the Parañaque City Hall). With the assistance of the two secretaries, the IEC Team was given permission to brief the concerned barangay captains about the proposed project and the planned city level scoping meeting. During the barangay coordination, the IEC Team obtained

copies of the barangay profiles and other related information materials needed for the People Section of the Environmental Impact Assessment (EIA) report. The Mayor and the barangay captains said that they are already aware about the LRT Line-6 Project and they await the project implementation in their jurisdiction.

2. **Muntinlupa City**. The IEC Team started the coordination with the Muntinlupa City LGU on the afternoon of 25 October 2018. Seastems' letter request along with the attached Project Description was received by the Mayor's Office. Deputy City Administrator Roger John Smith graciously welcomed the IEC team, allowed the team to explain the proposed project, acknowledged the objective of arranging a city-level scoping meeting with city officials, barangay officials and other stakeholders, and the need to gather requested materials for the environmental study especially the People component. The IEC team asked permission to visit the four impact barangays (Sucat, Cupang, Alabang and Ayala Alabang) but Mr. Smith said that it is not within his authority to give the IEC team the permission to go down to the barangays. Mayor Jaime Fresnedi was out of the country and City Administrator Engr. Allan Cachuela was out on official business when the IEC team visited, so Mr. Smith advised the IEC team to return the next day to talk to the City Administrator, who had the authority in the Mayor's absence to give the IEC team permission to go down to the project impact barangays.

   The Deputy Administrator said it was his first time to hear that the LRT Line-6 alignment will have a Muntinlupa segment. Mr. Smith also introduced the IEC team to Mr. Jose David Adriano, staff at the City Planning Office. Both Mr. Smith and Mr. Adriano confirmed that the project alignment will pass through the four identified impact barangays in Muntinlupa City. After the brief meeting at the Office of the Deputy City Administrator, Mr. Adriano gave the IEC team a copy of the Muntinlupa ecological profile.

   The IEC Team returned on 26 October 2018 at 0800H to the City Administrator's Office. However, the City Administrator did not have time to meet with the IEC Team due to other engagements and a scheduled budget hearing with the city council at 0900H. The team decided to seek a new appointment with the Mayor but the mayor's secretary could not assure the IEC team of an appointment slot.

   The meeting with Mayor Jaime Fresnedi occurred on 12 November 2018 through the coordination efforts of PAVI staff. Mayor Fresnedi favorably received the project and said that he has already seen and endorsed the previous letter from Seastems to the barangays concerned.

   With Mayor Fresnedi's permission, the team proceeded to the four host barangays (Sucat, Cupang, Ayala Alabang and Alabang) to talk to the barangay officials about the proposed project and the segment of the alignment that would pass through their respective jurisdictions. The introduction and request letter for barangay data were handed to the respective Barangay Captains or to their authorized officials who were present during the visit.

   The Mayor and barangay officials who were visited were open to the project and expressed willingness to help coordinate the city-level scoping meeting.

3. **Bacoor City**. The IEC team met with City Planning and Development Coordinator Engr. Jesus Francisco, Jr. on 14 November 2018 but the latter could not give permission to the team to proceed with the barangay visits. He called the ABC President for assistance but he was not available that day. The IEC team proceeded to the Office of the City Administrator after the meeting with Engr. Francisco. Mr. Jerome Oliveros (City Administrator) welcomed the Seastems environmental study team, gave permission for the IEC team to visit the 13 impact barangays along the proposed LRT Line 6 alignment in Bacoor, and even enlisted the assistance of Mr. Elmer Jimenez, Barangay Affairs Officer, to coordinate the schedule of the series of meetings with the concerned barangay officials.

   All the city officials (City Planning and Development Officer, City Administrator and his assistant, Bacoor Traffic Management Staff, and the Barangay Affairs Officer) and the barangay chairpersons of the 13 barangays visited from 14 to 16 November 2018 welcomed the project and agreed to organize their corresponding delegations to the city-level Scoping Meeting for Bacoor tentatively scheduled on 21 January 2019, 0830H at the Revilla Hall, Bacoor City Hall. It was agreed upon by the parties concerned and the IEC team that a formal

communication to confirm the final date and program of the Bacoor city level public scoping meeting will be sent to the Mayor's office, with a copy to be furnished to the Barangay Affairs Office and the City Administrator, and the 13 barangays at least a week prior to the activity.

4. **Las Piñas City**. Initial coordination with the Las Pinas City LGU was done on 06 November 2018. The IEC team was able to talk to City Administrator Mr. Reynaldo Balagulan who said that he was not aware about the project. He also inquired with the City Engineer, City Planning Officer and Councilor Henry Medina of the SP Infrastructure Committee and all were not aware about the project. The City Administrator suggested the following actions to pave the project's entry into their city:

    - The government agency in charge of the project (DOTr) should send a formal letter to the City LGU informing them about the proposed project and to expect PAVI and Seastems to visit the city for coordination and succeeding consultation activities;
    - PAVI should make a formal project presentation to key city officials (i.e., City Mayor, City Vice Mayor, key LGU department heads, concerned Sangguniang Panlungsod members); and
    - Determine with concerned LGU departments if the proposed project is compatible with the city land use plan (CLUP) and city development plan (CDP), notably the two proposed flyover projects of DPWH along Alabang-Zapote Road at intersections with CAA Road and Marcos Alvarez Avenue.

    PAVI arranged a meeting with the City Administrator and City Planning and Development Coordinator on 27 November 2018 to discuss the project and address the concerns of the City Administrator that were raised during the initial coordination work on 06 November 2018. The PAVI engineers and the IEC team met briefly with the City Administrator who said that the Mayor was informed about the project and expressed regret that he did not know about the project during the earlier meeting with the IEC team. He said that Engr. Leonida Lagrisola, the City Planning and Development Coordinator, will provide the assistance needed for the IEC/scoping activities. It was agreed during the meeting with Engr. Lagrisola that the CPDC staff will coordinate with the concerned barangay captains to attend a meeting with the IEC team and PAVI staff on 04 December 2018 for a briefing on LRT Line 6 Project and inform them about the preparations for the 17 January 2019 Las Piñas Scoping Meeting. This was deemed the fastest way of communicating with the concerned barangay officials. The CPDC also identified Verdant Homes covered court as possible venue for the city level scoping and this will be arranged with the concerned barangay captain.

    The IEC meeting for Las Piñas City that was conducted on 04 December 2018 from 0900 to 1100H was attended by the City Administrator, the City Planning and Development Coordinator, City Engineer, and barangay captains and/or representatives from the eight impact barangays. The meeting commenced with an opening prayer led by Mr. Alvin Nacu and was followed by the introduction of participants and discussion of the objectives of the IEC meeting given by Ms. Tessa Agravante. A brief presentation on the project alignment and potential impact areas in Las Piñas City was given by Ms. Armie Jean Perez. This was followed by an open forum that was facilitated by Ms. Agravante. Issues raised during the open forum include the following: (1) provision of parking spaces for cars, bicycles and motorcycles in the train stations within the city; (2) incorporation of pedestrian walkway from Naga Station to tricycle terminal; and (3) proper management of project impacts during construction such as traffic congestion and air pollution from dust emissions. The barangay and city officials also noted that the project will improve the transport system in the city and will help alleviate the traffic problem in Las Piñas. The barangay officials also noted some corrections that need to be made in the project description given to them such as the correct barangay name and road names.

5. **Dasmariñas City**. The IEC team visited the Dasmariñas City LGU on 26 October 2018 to initiate the coordination for the city level scoping activity. However, Mayor Elpidio Barzaga asked several project details (i.e., how wide, how high, where are the exact stations, what are the properties near such stations) that the IEC team could not answer at the time so PAVI staff coordinated with the Mayor's Office to schedule another appointment with the Mayor. The second meeting happened on 28 November 2018 and the Mayor again raised several technical questions which prompted Engr. Santos of PAVI to say that he will ask for a PAVI

technical team to give the Mayor and his staff a proper project presentation where all questions will be answered. The Mayor said he wants to know all the details to make sure that he makes all the necessary arrangements and provisions for the project. After the second meeting, Mayor Barzaga granted permission for the IEC team to visit the four host barangays (Salawag, Paliparan 1, Paliparan 2, and Paliparan 3) to make the necessary project briefings and arrangements with the barangay officials for the Dasmariñas city level public scoping meeting on 21 January 2019 from 1330H to 1630H. Suggested venue by Engr. Santos is Island Park and he said that he will make the arrangements for this scoping venue.

Table 10-2. Summary of Issues and Concerns raised during the IEC Activities.

Issues and Concerns	Parañaque	Muntinlupa	Las Piñas	Bacoor	Dasmariñas
Project Description					
Project stage and completion date		✓	✓		
Project alignment has sharp curves				✓	✓
No problem with project alignment since structure is elevated and will be built on center island				✓	
Why is project alignment off the road?				✓	✓
Why does alignment not pass through Aguinaldo Highway?					✓
Exact location of project alignment				✓	✓
Constructing piers on road will decrease road width				✓	✓
Consider electricity posts on both sides of the road				✓	
Structure might collapse on houses				✓	
Consider other infrastructure and development projects in the city			✓	✓	✓
Air					
Noise impact especially at night	✓			✓	
People					
Officials were already aware about the project	✓			✓	
LGU welcomes the project	✓	✓	✓	✓	✓
Jeepney operators and drivers associations, business establishments, subdivisions and affected schools should be invited to the public scoping	✓	✓	✓	✓	✓
Expansion of business opportunities is foreseen		✓			
Increased daytime foot traffic and business activity is expected		✓			
Traffic impact during construction is expected	✓	✓	✓	✓	✓
Project will ease traffic problem		✓	✓	✓	✓
Subsequent road widening will affect houses along the road				✓	✓
Avoid ROW acquisition on private properties				✓	
Will project contribute to barangay IRA?				✓	
Project will shorten travel time to Metro Manila					✓
Rerouting will be necessary during construction				✓	
Access of residents will be hampered during construction				✓	
Others					
Project will improve transport system	✓	✓	✓		
Proper spoils management during construction	✓				
Project will augment needed road infrastructure		✓	✓		
No major negative impact is foreseen			✓	✓	

Table 10-3. Summary of IEC Activities (Courtesy Visits/KIIs) Conducted for Host Cities and Barangays.

Date	Office	Representative	Activities	Issues Raised
1. PARAÑAQUE CITY				
24 October 2018 0830H	Office of the Mayor	Ms. Cathy Bonsol (Mayor's Secretary)	• Submitted letter request for IEC and data collection • Informed the staff about the proposed project • Requested for appointment with the Mayor • Requested permission to visit host barangays	• The LGU staff were already aware about the project and readily gave permission for the IEC team to visit the host barangays • Mayor holds Kasalang Bayan on Thursdays, so it was suggested to schedule scoping on other days
24 October 2018 0900H	Barangay San Antonio	• Barangay Staff • Barangay Secretary Jomar Eugenio	• Talked to barangay staff and requested appointment with barangay captain and barangay profile from barangay secretary	• Barangay staff told IEC team to submit formal request for appointment and data requests addressed to the barangay captain. Data was provided when letter was submitted.
24 October 2018 0930H	Barangay San Isidro	• Barangay Captain Noel P. Japlos • Barangay Administrator Alfred A. Agor • Barangay SWM Consultant Milou Carlos	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• Project will improve transport system • Traffic impact during construction is expected • Noise is an issue. Construction at night should be avoided during construction • There should be proper spoils management during construction
24 October 2018 1000H	Barangay San Dionisio	• Barangay Administrator Erlinda Bernardo • Kagawad Melencio Santos • Engineer Saporna (Brgy. Engineering Office)	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• Jeepney operators and drivers' associations should be invited to public scoping • Barangay will identify other project stakeholders such as business establishments. • LRT Line-1 Extension Station located in the barangay
24 October 2018 1100H	Barangay Sto. Niño	• Barangay Captain Johnny Co • Barangay Secretary	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• Barangay is open to the project. • Barangay stakeholders will include commercial establishments and residents passing through Dr. A. Santos Avenue • It is better to hold scoping in Barangay San Dionisio basketball court
24 October 2018 1330H	Barangay La Huerta	Barangay Administrator Orlando Tuscano	• IEC team explained the project alignment to the barangay official and requested data from the barangay	• Barangay is open to the project. • Barangay will identify project stakeholders and

Date	Office	Representative	Activities	Issues Raised
			• Tentative schedule of city level public scoping was communicated	will invite them to attend the city level scoping meeting
24 October 2018 1430H	Barangay BF Homes	Barangay Secretary Excel Nillar	• IEC team explained the project alignment to the barangay official and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• Barangay is open to the project. • Southern part of Dr. A. Santos Avenue is within the barangay • Affected areas will include business establishments along the road and residents passing through Dr. A. Santos Avenue
25 October 2018 1000H	Office of the Mayor	Mayor Edwin Olivarez Ms. Cathy Manio (Secretary of City Administrator)	• IEC team explained the project alignment • Mayor advised IEC team to coordinate with LGU staff regarding arrangements for city level scoping meeting	• The city is open to the project and is eagerly awaiting project implementation • Tentative schedule of city level scoping was discussed, and venue was reserved.
2. MUNTINLUPA CITY				
25 October 2018 1400H	Office of the City Administrator	• Deputy City Administrator Roger John Smith • CPDO Staff Jose David Adriano	• IEC team explained the project alignment • Mr. Smith advised the IEC team to set appointment with City Mayor to seek permission to visit the host barangays • This was the first time that the Deputy City Administrator heard about the LRT Line-6 Project and that there is an alignment within Muntinlupa City	• Mr. Smith said that Muntinlupa Sports Complex is possible scoping venue. • City officials confirmed the project alignment and possible affected areas and establishments (Filinvest, San Beda, Ayala Alabang Masagana, Alabang Hills, other subdivisions, etc.)
12 November 2018 0800H	Office of the Mayor	• Mayor Jaime Fresnedi • CPDO Chief Noel Cadorna	• IEC team handed the PAVI introduction letter and project description and the Mayor said that previous letter from Seastems was already endorsed to concerned barangays and LGU departments • Mayor Fresnedi gave permission for the IEC team to visit the host barangays • The Mayor welcomed the city-level scoping meeting and IEC team was asked to send official communication	• The Mayor asked at what stage the project is and when is the completion date • Project is appreciated as it will augment the needed road infrastructure in the city • Expansion of business opportunities is foreseen • Traffic difficulties is foreseen during the construction stage • Mayor Fresnedi suggested to hold the scoping somewhere in Alabang since impact barangays are located in District 2 and are located far from the City

Date	Office	Representative	Activities	Issues Raised
			detailing list of invited participants, program, desired results and venue at least one week before the activity	Hall and Muntinlupa Sports Complex
12 November 2018 0930H	Barangay Sucat	• Barangay Captain Rafael Sevilla • Barangay Secretary Bob Velasco	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay captain warmly received the project • The identified project stakeholders who will be invited to city-level scoping meeting include barangay officials, PNCC, Lakeshore developers and HOA officials of affected subdivisions • Increased daytime foot traffic and business activity is expected
12 November 2018 1100H	Barangay Alabang	• Mr. Jeric Panganiban (Personal Secretary of Barangay Captain)	• IEC team explained the project alignment to the barangay official and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• IEC team was advised to set appointment with Barangay Captain Christine May Abas on 19 November 2018, but she was still busy when the IEC team returned • List of requested documents will be communicated to Barangay Secretary
12 November 2018 1330H	Barangay Ayala Alabang	• Barangay Secretary Dodie Matanguihan • Barangay Kagawad	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay officials welcome the project • Project impacts will only be felt during construction and is expected to benefit the easing of traffic in the long term • People residing in the barangay will not mind the temporary disturbance
12 November 2018 1500H	Barangay Cupang	• Barangay Kagawad Aaron Aquino (Infrastructure Committee) • Kag. Christopher Arevalo (Health Committee) • Anna Ancha (Representative of Barangay Secretary)	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay officials expressed openness towards the project • Madrigal Station site is within the jurisdiction of Barangay Cupang • Stakeholders will include business owners, call centers, schools and residential areas
19 November 2018 0900H	Barangay Cupang	• Barangay Captain Rainier Bulos • Barangay Council Members (7)	• All barangay officials were present for the flag ceremony held at 0800H at the barangay	• The barangay officials welcome the project • Traffic impact during construction is expected,

Date	Office	Representative	Activities	Issues Raised
		• Barangay Secretary Mc John Nicolas	stage and covered court • The IEC team explained the project alignment to the barangay officials • The tentative schedule of the city level scoping meeting was communicated	particularly in the vicinity of San Beda College where 3,000 vehicles/day pass through • Other stakeholders include business establishments and subdivisions, transport groups
19 November 2018 1100H	Barangay Alabang	• Barangay Secretary Floyd Joseph Reynante	• IEC team explained the project alignment to the barangay official and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• Madrigal Station should come first before Town Center Station • Commercial and residential areas along the Alabang-Zapote Road will be affected, including San Jose Village, Filinvest, Alabang Public Market, Alabang Town Center • Committee on infrastructure will be invited to attend scoping meeting • Alabang Elementary School covered court possible scoping venue but available only on weekends • Invite Muntinlupa Traffic Management Department and transport organizations to the scoping meeting
3. BACOOR CITY				
14 November 2018 0900H	City Planning and Development Office	Engr. Jesus Francisco, Jr.	• IEC team explained the project alignment • Tentative schedule of city level public scoping was communicated • Engr. Francisco tried to assist IEC team by coordinating with ABC President Reynaldo Palabrica but the latter was on an out of town trip to Boracay	• The project has long been awaited • He took notice of the sharp curves • Bacoor CLUP is being updated; latest version (CLUP 2015-2024) is being revised to comply with the Mayor's instructions
14 November 2018 0930H	Office of the City Administrator	• Mr. Jerome Oliveros (City Administrator) • Atty. Roy Cheng	• IEC team explained the project alignment and requested permission to visit the 13 host barangays • Tentative schedule of city level public scoping was communicated	• The City Administrator welcomed the project • He asked Atty. Cheng to coordinate with Barangay Affairs Office Executive Officer, so he can schedule appointments with concerned barangay officials

Date	Office	Representative	Activities	Issues Raised
14 November 2018 1000H	Bacoor Barangay Affairs Office (BAO)	• BAO Executive Officer Elmer Jimenez	• IEC team explained the project alignment and requested assistance in coordinating with 13 host barangays • Mr. Jimenez was able to set up appointments with 11 out of 13 impact barangays in Bacoor	• Mr. Jimenez warmly welcomed the IEC team and called the concerned barangay officials to set up appointments for the IEC team • He said that setting appointments with barangay captains will be easier and more efficient
14 November 2018 1400H	Barangay Talaba IV	• Barangay Captain Julieto T. Arcega • Barangay Secretary Rochelle Reynes	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• Where is the exact alignment in Talaba IV? • No major problem is foreseen since elevated structure will be built on center island • LRT 6 will ease traffic problem • Stakeholders to be invited include transport groups, Talaba Elem. School, St. Dominic School and Hospital and barangay officials • Project will alleviate traffic condition in Talaba • Barangay has knee deep floods during heavy rains
14 November 2018 1500H	Barangay Molino III	• Barangay Captain Apolonio Advincula, Jr. • Barangay Secretary Ambrosio Esguerra • Barangay Treasurer Viray • Kag. Michael Bautista (Sanitation and Environment Committee) • Kag. Josie Criste (Committee on Social Welfare)	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay officials welcome the project • The barangay has 26 subdivisions and several commercial establishments along major roads • Rerouting might be necessary during construction • Stakeholders to be invited include University of Perpetual Help, St. Thomas Elementary and High Schools, other schools, Public Market, Camella Homes, Jeepney and vans operators and drivers' associations, homeowner associations (Cita Italia), PNP, Bacoor Traffic Management Department
15 November 2018 0930H	Barangay Molino VI	• Barangay Captain Ronaldo Javier • Barangay Secretary Roberto Cruz	• All barangay council members were present for their regular session • IEC team explained the project alignment to the barangay officials and	• The barangay officials welcome the project • Affected areas in the barangay include open areas (ARC Compound/Villar Property,

Date	Office	Representative	Activities	Issues Raised
		• Barangay Council Members	requested data from the barangay • Tentative schedule of city level public scoping was communicated	Maralit Compound) and residential areas (Soldiers Hills Phase 2 and 4, BF El Grande?)
15 November 2018 1100H	Bacoor Traffic Management Department	• Mr. Adel Udarbe	• IEC team explained the project alignment and asked how project will impact traffic management in the city • Tentative schedule of city level public scoping was communicated	• The LGU welcomes the project • Traffic will worsen at Talaba Station of LRT Line 1 Extension since vehicles to and from Cavite municipalities are expected to bring and/or fetch passengers from the station; traffic volume is now at 4,000 vehicles/hour during peak periods • With the proposed LRT Line 6 project, it is anticipated to decongest traffic in the Talaba area and ease traffic in Bacoor • BTMD will plan rerouting schemes during construction in addition to solidarity routes being implemented in the city
15 November 2018 1300H	Barangay Molino IV	• Barangay Captain Jeffrey Campana • Kag. Wilfredo Tating • Barangay Secretary Sofia Fajardo	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay officials welcome the project • They want to know exact location of the project • Possible affected areas in the barangay include Villar property, and properties of the Ignacio, Camacho and Fe de Castro families • A flyover project is planned in the intersection of Daang Hari and Molino-Paliparan Road • Commercial and business establishments along Molino Road include Molino Town Center, SM Molino, All Day/All Home, and Vista Mall
15 November 2018 1400H	Barangay Niog III	• Barangay Captain Pastor Sagenes • Barangay Secretary Anne Flores	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay officials welcome the project • No big impact is foreseen since the project will be located on the middle of the 6-lane Molino Boulevard • LRT Line 1 Extension Station is located within the barangay

Date	Office	Representative	Activities	Issues Raised
				• Both sides of Molino Boulevard are still open spaces owned by the Aguilar and Kalinisan families • Warehouses are the main establishments in the barangay • There are planned condotels, hotels and gasoline stations near the de Castro stoplight
15 November 2018 1500H	Barangay Molino I	• Barangay Captain Jeo Dominguez • Barangay Secretary Arlene Ramos	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay officials welcome the project • The alignment will possibly pass through Zone 3 on Molino Road • Molino Road is narrow with only two lanes and no shoulders • Diameter of pier/column will decrease road width and subsequent road widening will affect houses along the road • There are electricity posts on both sides of the road • Will the project cause noise disturbance to the community? • Will the structure not collapse on the houses? • Camella Lessandra is within Molino 1 • Avoid ROW acquisition on private properties • Rerouting will be necessary during project construction and temporary closure of Molino Road, Bayanan Road to Molino Boulevard may be implemented
16 November 2018 0900H	Barangay San Nicolas III	• Barangay Captain George Gawaran • Barangay Secretary Priscilla Orig • Barangay Councilors	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay officials welcome the project • The project will ease the traffic in their area and most of Bacoor • Why is the segment in their barangay off the road? • Possible affected areas are open spaces (about 200 hectares) that were previously agricultural land but now owned by Banco Filipino and Villar family

Date	Office	Representative	Activities	Issues Raised
				• Engineers of Camella will be invited to attend the public scoping • Project is expected to be favorable for barangay residents • Will project contribute to barangay IRA?
16 November 2018 1000H	Barangay Bayanan	• Barangay Captain Alfie Gawaran • Barangay Secretary Regie Ugalde	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay officials welcome the project • Project segment will pass through private properties owned by Gawaran and Villar families • Bacoor City Hall and Government Center is within the barangay
16 November 2018 1100H	Barangay Molino II	• Barangay Captain Michael Saquitan • Asst. Barangay Secretary Genesis Ventura	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• Development projects are welcome in the city • Project will ease traffic congestion along Molino Road • Segment in barangay will mostly be on Molino Road; RFC Mall is the largest commercial center • Rerouting will be necessary; Bacoor has solidarity routes • Transport groups and representatives of residential areas need to be informed
16 November 2018 1130H	Barangay Ligas III	• Barangay Captain Pablo Morales • Barangay Secretary Heidi Mendoza	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay is open to the project • The alignment will be on Molino Boulevard • Stakeholders will include Home Aid (under construction) and HOA of Westville Phases 1 to 5 • Access of residents may be hampered during construction and operation • Barangay area along Bacoor/ Molino Boulevard is largely residential and commercial
16 November 2018 1400H	Barangay San Nicolas II	• Barangay Captain Edward Pantoni • Barangay Executive Officer Rodel Solis	• IEC team explained the project alignment to the barangay officials and requested data from the barangay	• The barangay is open to the project. • They want to know exact site of the segment that will pass through their barangay.

Date	Office	Representative	Activities	Issues Raised
			• Tentative schedule of city level public scoping was communicated	• Why is the project designed to go off the existing road? It should follow existing roads • Will the project enter Camella East? • Barangay Aniban may be an impact area
16 November 2018 1430H	Barangay San Nicolas I	• Barangay Captain Sonny Boy Francisco • Barangay Secretary Allan Allanigue • Barangay Treasurer Renato Ordinez, Jr.	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay officials welcome the project • Open spaces will be affected particularly Villar property • Starmall that is under construction along Molino Boulevard is within the barangay; traffic volume is expected to increase when mall becomes operational • Barangay has 7 subdivisions, 6 private resorts and small commercial establishments
16 November 2018 1500H	Barangay Ligas II	• Barangay Secretary Jose Guinto • Barangay Treasurer Victorino Pascual • Barangay Head Lupon Tagapamayapa Jose Tolentino	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated • Note: Mr. Jimenez of the Barangay Affairs Office tried to arrange an appointment with Barangay Captain Delfin Pascual, Jr. but he was hospitalized for gallbladder operation at the time of the visit.	• The barangay officials are open to the project • Specific segment that will traverse their barangay is on Molino Boulevard • No major negative impact is foreseen. • Traffic on Molino Boulevard is not that busy as areas on both sides of road are still being developed • Subdivisions include de Castro, Coastal Wood and Wood Crest • Establishments include Silangan Memorial Garden and Funeraria Atienza • Commercial establishments along Molino Boulevard include trucking, gas station, eateries • About 40,000 square meters of open area in barangay is located along Molino Boulevard
4. LAS PIÑAS CITY				
06 November 2018	Office of the City Administrator	• Mr. Reynaldo Balagulan	• IEC team explained the project alignment and requested permission to visit the 9 host barangays	• The city administrator called the heads of the City Planning Office, City Engineering Office and Councilor Henry Medina of the SP Committee on

Date	Office	Representative	Activities	Issues Raised
				Infrastructure to ask if they know about the LRT-6 Project and all said that they were not aware about the project. • Mr. Balagulan advised the IEC team to present the project to the City Mayor, City Council and key LGU department heads before commencing the IEC for impact barangays. • He also saw the need to check if the project matches the city development plan. • He mentioned that flyover projects are planned on Alabang-Zapote at the corners with CAA Road and Marcos Alvarez since traffic congestion normally occurs in these areas.
27 November 2018	City Administrator and City Planning and Development Coordinator	• Mr. Reynaldo Balagulan (City Administrator) • Engr. Leonida Lagrisola (City Planning and Development Coordinator) • Mr. Arman Aguilar (CPDO Staff)	• This appointment was set up by PAVI staff • IEC team explained the project alignment and requested permission to visit the 8 host barangays • Tentative schedule of scoping meeting was communicated • Engr. Lagrisola and Mr. Aguilar coordinated with barangay captains for meeting scheduled on 04 December 2018 at Max's Restaurant for a project briefing and inform them about the city level scoping meeting on 17 January 2019.	• The City Administrator said that the Mayor was already informed about the project and instructed the CPDC to give the assistance needed for the IEC/scoping activities. • Engr. Lagrisola expressed support for the project and said that it will be considered and included in the city CLUP which is due for approval. • CPDO staff will arrange meeting with barangay captains of 8 impact barangays so IEC team can present the project
04 December 2018	• CPDO • Host barangays: ○ Almanza Uno ○ Talon Singko ○ Pulang Lupa Dos ○ Talon Uno ○ Talon Dos ○ BF Intl/CAA ○ Pamplona Tres	• CPDO Staff • Barangay officials of host barangays	• The IEC team gave a project briefing and discussed the needed preparations for the city level scoping meeting	• Provision of parking spaces in stations for cars and bicycles or motorcycles • Provision of walkway from Naga Station to tricycle terminal • Management of project impacts during construction such as traffic congestion and air pollution from dust emissions • Consult with city traffic management division

Date	Office	Representative	Activities	Issues Raised
				• Correct page 6 of project description to reflect Talon Uno • Indicate in PD that alignment will not pass through Naga Road
5. DASMARIÑAS CITY				
26 October 2018 1000H	Mayor's Office	• Mayor Elpidio Barzaga, Jr. • Ms. Aisa Sango (City Administrator)	• IEC team explained the project alignment and requested permission to visit the 4 host barangays	• The IEC team tried to explain the project alignment and told the mayor that they are seeking permission to make arrangements for a city-level scoping meeting, but the mayor asked for details such as the width and height of the structure, exact location of the stations, affected properties, etc. • The City Administrator advised the IEC team to set up a meeting with the mayor and provide complete project details since that was how the mayor wanted things done in their city.
28 November 2018 1100H	Mayor's Office	• Mayor Elpidio Barzaga, Jr. • Ms. Aisa Sango (City Administrator) • Engr. Mildred Laudato (City Assessor)	• This appointment was set up by PAVI staff • The IEC team explained the project alignment and requested permission to visit the 4 host barangays • Tentative schedule of scoping meeting was communicated	• The Mayor bombarded the team with technical questions which prompted the Engr. Santos of PAVI to say that he will ask PAVI technical staff to make a proper project presentation where all the mayor's questions will be answered. • Mayor Barzaga granted permission for the IEC team to visit the four host barangays
28 November 2018 1330H	Barangay Salawag	• Barangay Captain Victor Topacio • Asst. Brgy. Secretary Mae Jo Daphne Peña	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay captain asked why the project alignment will not pass through Aguinaldo Highway and he was informed that this alignment was proposed by another group. • He also asked why the alignment deviated from Molino-Paliparan Road. He identified the open spaces that will be traversed by project alignment as the properties of the Villar Family and Banco Filipino

Date	Office	Representative	Activities	Issues Raised
				• The barangay captain welcomes the project as it will ease traffic which becomes really heavy especially on weekends. • The barangay captain will invite project stakeholders such as HOA officials, transport groups, and barangay officials.
28 November 2018 1400H	Barangay Paliparan III	• Barangay Secretary Jeanrose Garabiles	• IEC team explained the project alignment to the barangay official and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• Ms. Garabiles said that she appreciates the project as it will facilitate and shorten travel time from Dasmariñas to Metro Manila. • She said that Paliparan III is a resettlement area of former informal settlers from Pasay and Tondo. The residents still go to Metro Manila for work.
28 November 2018 1430H	Barangay Paliparan II	• Barangay Treasurer Lisa Hormillosa	• Barangay Captain Ernesto Santiago and other barangay officials were on an out of town trip during the visit • IEC team explained the project alignment to the barangay official and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay treasurer advised the IEC team to return on 04 December 2018 to talk to the barangay captain. • She personally welcomes the project. • She said that the barangay has agricultural and commercial areas as well as subdivisions (Caribee, Camella, Mabuhay 2000)
28 November 2018 1500H	Barangay Paliparan I	• Barangay Secretary Princess Joy Candaba • Barangay Treasurer Noralyn Chua	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• The barangay secretary set an appointment for the IEC team to meet the barangay captain and council members on 04 December 2018 at 1500H. • Both the barangay secretary and barangay treasurer like the project.
04 December 2018 1230H	Barangay Paliparan II	• Kap. Ernesto Santiago • Sec. Eduardo Puerta	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• Road widening is being undertaken on Molino-Paliparan Road from current 4 lanes to 6 lanes • City is implementing 5m setback for commercial spaces and houses located along existing roads • LRT 6 will improve access of residents going to Metro Manila

Date	Office	Representative	Activities	Issues Raised
				• 70% of barangay residents work in Manila
04 December 2018 1400H	Barangay Paliparan I	• Kap. Remigio Beberino • Sec. Princess Joy Candaba	• IEC team explained the project alignment to the barangay officials and requested data from the barangay • Tentative schedule of city level public scoping was communicated	• Road widening has started in Barangay Salawag • Road widening should be done first before LRT 6 is constructed • Project is favorable to the barangay since it will ease traffic or improve travel time • Traffic congestion will be a concern during construction

Tentative Schedule of Site Scoping for LRT Line-6A and Line-6B+C Project

With five host cities and 35 impact barangays, the consultant found it prudent to schedule city-level public scoping meetings for each of the five host cities. The city level scoping meetings will be held in the city hall or an appropriate venue identified by the host LGU. Due to the difficulty in arranging schedules for the use of meeting venues, the consultant have set appointments with the concerned LGUs for the use of their facilities for the public scoping. Below is the tentative schedule of the public scoping activities. The consultant advised the LGU officials that official invitation letters for the public scoping will be sent 7-10 working days prior to the meeting when schedules have been approved by DENR-EMB.

Date	Time	City	Venue	No. of Barangays	No. of Participants
16 January 2019	0800H – 1200H	Parañaque	Mayor's Hall 2/F City Hall	6	120 – 150
17 January 2018	0830H – 1200H	Las Piñas	Villar SIPAG Hall, C-5 Avenue Ext.	8	180 – 200
18 January 2018	0800H – 1200H	Muntinlupa	Max's Restaurant Westgate Center Alabang	4	80 – 100
21 January 2018	0800H – 1200H	Bacoor	Revilla Hall 3/F City Hall	13	200-250
21 January 2018	1330H – 1700H	Dasmariñas	Island Park	4	80 – 100

Note: Scoping venues for Las Piñas and Dasmariñas will be confirmed at a later date.

The barangay officials were requested to bring 15-20 participants to the city level scoping, consisting of barangay officials and stakeholder representatives from transport group associations, homeowner's associations, institutions (schools, churches, etc.), property owners, business group associations, etc.

The draft presentations for the city level scoping meetings are presented in Annex 2.

List of Identified Project Stakeholders

Table 4 shows the identified project stakeholders during the IEC campaign for the LRT Line-6A and Line-6B+C Project. The list includes the city and barangay officials visited. The barangay officials were requested to bring 15-20 participants per barangay to the city level scoping meetings consisting of barangay officials, transport groups, homeowners' association representatives, business establishments, and property owners that may be affected by the project alignment.

The draft invitation letters for the city level public scoping meetings are presented in **Annex 3**.

Table 10-4. List of Project Stakeholders of the LRT Line-6A and Line-6B+C Project.

Office	Name of Contact Person	Address / Email	Contact No.
DENR EMB Central Office	Dir. Metodio U. Turbella EMB Director	DENR Compound Visayas Ave., Quezon City	02.927.1517 02.928.3725
DENR EMB EIAMD	Atty. Michael Drake P. Matias OIC Chief	DENR Compound Visayas Ave., Quezon City	02.920.2240
Department of Transportation	Atty. Timothy John R. Batan OIC Undersecretary for Rail and Toll Roads	tj.batan@dotr.gov.ph Unit 2530 Apo Court Along Sergio St. Clark Freeport Zone, Pampanga	TL 790.8300/8400 Local 706
Department of Transportation	Engr. Joel R. Magbanua Division Chief Rail Transport Planning	Room 67 The Columbia Tower Brgy. Wack-wack, Ortigas Avenue Mandaluyong City	TL 790.8300/8400 Local 744/343 726.6648
MMDA	Dir. Ma. Josefina J. Faulan Metropolitan Development Planning Service		882.4151 to 77 local 1097
MMDA	Asec. Roberto T. Almadin AGM for Operations		882.0916 882.4151 to 77 local 1061
PARAÑAQUE CITY			
Mayor's Office	Hon. Edwin L. Olivarez Cathy Bonsol (Secretary)		02.820.7783 02.624.9623 0917.579.8677
Vice Mayor's Office	Hon. Rico T. Golez		
Congressman 1st District	Hon. Eric Olivarez		
Cong. 2nd District	Hon. Gustavo Tambunting		
Chairman, SP Committee on Environment			
Chairman, SP Committee on Infrastructure			
City Administrator	Mr. Fernando Soriano Cathy Amanio (Secretary)		02.820.7783 541.0226 (F) 0917.630.6519
City Planning Office	Engr. Jun Rivera		
City TMO	Mr. Teodorico Barandino		
City ENRO	Bernardo N. Amurao		02.829.8701 02.826.6147
City Engineering	Engr. Aser S. Mallari		02.826.8272 02.478.8596 02.829.3077
City Information Office	Mr. Mario L. Jimenez		02.829.0866
Police Station	PS/Supt. Leon Victor Z. Rosete		
ABC President	Hon. Chris Aguilar Brgy. Marcelo Green		
Brgy. BF Homes	Hon. John Paolo N. Marquez Brgy Sec. Excel Nillar		659.2789/809.8843 0935.197.0138
Brgy. La Huerta	Hon. Peter Augustine N. Velasco Brgy. Adm. Orlando G. Tuscano	 buboytuscano@yahoo.com	829.6152/825.6048 0917.310.0157
Brgy. San Antonio	Hon. Leopoldo C. Casale Brgy. Sec. Jomar F. Eugenio Brgy. Adm. Celeste Kibanoff Brgy. Asst. Sec. Jellyn Bautista	0927.957.1943	467.1004/935.3071 0936.164.7043
Brgy. San Dionisio	Hon. Pablo R. Olivarez, MD Brgy. Adm. Erlinda Bernardo Kag. Melencio Santos Engr. Saporna (Brgy Engg Office)		813.3223/3252 0917.808.8929 0915.543.9770 824.6279

Office	Name of Contact Person	Address / Email	Contact No.
Bgy. San Isidro	Hon. Noel P. Japlos Brgy. Adm. Alfred Agor Brgy. SWM Consultant Milou Carlos	 miloucarlos@gmail.com let.carlos1@gmail.com	788.0356 09062551216 0918.926.6896
Brgy. Sto. Niño	Hon. Johnny C. Co		852.0128/852.7477
MUNTINLUPA CITY			
Mayor's Office	Hon. Jaime R. Fresnedi	2F Muntinlupa City Hall National Road, Putatan, Muntinlupa City	02.862.2525 local 142-143, 135
Vice Mayor's Office	Hon. Celso C. Dioko		
Chairman, SP Committee on Environment			
Chairman, SP Committee on Infrastructure			
City Administrator	Mr. Engr. Allan A. Cachuela Mr. Roger John Smith (Deputy)	2F Main Building	02.862.2525 L 105/112/147/148 0920.964.1104
City Planning Office	EnP Noel A. Cadorna Jose David E. Adriano	2F Annex Building	02.862.8065 0939.258.3809
Muntinlupa Traffic Management Bureau	Mr. Danidon N. Nolasco	3F Starmall officialmtmb@gmail.com	831.9884
City ENRO	Ms. Lorna B. Misa	5F Annex Building	02.861.9937
City Engineering	Engr. Dynadelle N. Aranda	2F Main Building	02.862.2525 local 170-172, 164-175
Police Station	PS/Supt. Nicolas Salvador	Centennial Avenue cor. Laguerta, Tunasan, Muntinlupa City	02.862.2611 0908.377.0084
Alabang Brgy Captain	Hon. Christine May A. Abas Brgy. Sec. Floyd Joseph Reynante	bagongalabang.muntinlupa @ gmail.com	 0956.645.0402
Ayala Alabang	Hon. Ruben P. Baes		
Cupang Brgy Captain	Hon. Rainier Emmanuelle B. Bulos Brgy. Sec. Mc John Nicolas		
Sucat Brgy Captain	Hon. Rafael T. Sevilla	sucat.muntinlupacity@gmail.com	
BACOOR CITY			
Mayor's Office	Hon. Lani M. Revilla	mlmroffice@gmail.com	046.481.4140
Vice Mayor's Office	Hon. Karen S. Evaristo		046.481.4137
Congressman	Hon. Strike B. Revilla		
Chairman, SP Committee on Environment			
Chairman, SP Committee on Infrastructure			
City Administrator	Mr. Jerome Oliveros Atty. Roy Cheng		046.481.4142
City Planning Office	Engr. Jesus D. Francisco	mpdc_bacoor@yahoo.com cpdcbacoor@gmail.com jessfran625@gmail.com	046.481.4100/315 046.434.6616
Barangay Affairs Office	Mr. Elmer Jimenez	elmerjiii@gmail.com elmerjiii@yahoo.com	0956.746.2279
Bacoor Traffic Office	Geronimo del Rosario Adel Udarbe	btmdbacoor@gmail.com	046.481.4100 L 233 0998.557.3097
City ENRO			046.481.4128
City Engineering			046.481.4134
ABC President	Hon. Reynaldo Palabrica	Queen's Row Central	0998.567.6237
Brgy. Ligas 2	Kap. Delfin Pascual	ligas2bacoorcavite@gmail.com	

Office	Name of Contact Person	Address / Email	Contact No.
	Sec. Jose V. Guinto		0922.449.4587
Brgy. Ligas 3	Kap. Pablo N. Morales Sec. Heidi Mendoza	ligas3barangay@gmail.com heidiycelmendoza@yahoo.com	 0947.1013219
Brgy. San Nicolas 1	Kap. Sonny Boy Francisco Sec. Allan Allanigue	brgy.sannicolas1@gmail.com	0919.426.9212 0935.555.5846
Brgy. San Nicolas 2	Kap. Edgardo G. Pantoni Brgy ex-o Rodel S. Solis	sannicolas2bacoor@gmail.com	0908.626.6362 0918.579.5310
Brgy. San Nicolas 3	Kap. George G. Gawaran Sec. Priscilla Orig	 itchieorig@yahoo.com.sg	 0929.876.6342
Brgy. Molino 1	Kap. Jeo Dominguez Sec. Arlene Ramos	barangaymolino1@gmail.com	0921.795.5433 0920.658.4844
Brgy. Molino 2	Kap. Michael J. Saquitan Sec. Gracia Baria Asst. Sec. Genesis Ventura	barangaymolinoii@gmail.com	0908.988.1431 0919.812.5175 0906.095.2898
Brgy. Molino 3	Kap. Apolonio I. Advincula, Jr. Brgy Sec Ambrosio Esguerra Kag. Michael Bautista (Sanitation and Environment Committee) Kag. Josie Criste (Social Welfare and Culture Committee)	brgy.molino3@gmail.com	046.477.1959 0926.277.7282
Brgy. Molino 4	Kap. Jeffrey P. Campaña Kag. Wilfredo Tating	brgymolinokwatro2018@gmail.com	046.477.1530 0917.244.4553
Brgy. Molino 6	Kap. Ronaldo Javier Sec Roberto Cruz	cruz.roberto85@yahoo.com	 0917.891.3312
Brgy. Niog 3	Kap. Pastor Sagenes Sec. Annalyn Flores	annefranc13@yahoo.com	 0908.459.0028
Brgy. Bayanan	Kap. Alfie O. Gawaran Sec. Regie Ugalde	pinagpalangbarangaybayanan @gmail.com	 0949.951.8193
Brgy. Talaba IV	Kap. Julieto T. Arcega Sec. Rochelle Reynes	barangaytalaba4@gmail.com	0922.559.8816 046.519.8206
KASAMA KA (Molino3)	Mr. Narciso Nato (transport group)		
LAS PIÑAS CITY			
Mayor's Office	Hon. Imelda T. Aguilar	imeldaaguilar@gmail.com	02.871.4343 02.871.4345
Vice Mayor's Office	Hon. Luis I. Bustamante		02.776.3515
City Administrator	Mr. Reynaldo C. Balagulan		02.871.4343 02.8714345
Chairman, SP Committee on Environment	Hon. Filemon Aguilar III		
Chairman, SP Committee on Infrastructure	Hon. Danilo V. Hernandez		
Chairman, SP Committee on Planning	Hon. Renan H. Riguera		
City Planning Office	Engr. Leonida Lagrisola City Planning Officer Mr. Arman Aguilar		02.872.0921 0922.814.9227
City Traffic Office	PSupt. Conrado N. Bunyi Chief, Vehicle Traffic Investigation Unit		02.856.3132
City ENRO	Engr. Cesar R. Perillo OIC		02.779.8695
City Engineering	Engr. Rose Bantog		02.873.3004
City Information Office	Mr. Jimmy L. Castillano		02.836.4366

Office	Name of Contact Person	Address / Email	Contact No.
ABC President	Hon. Roberto Cristobal ABC President		02.779.8117
Brgy Almanza Uno	Kap. Bonifacio M. Ramos		
Brgy BF International	Kap. Filemon A. Aguilar, Jr.		
Brgy Manuyo Dos	Kap. Mark Nery		
Brgy Pamplona Tres	Kap. Jose Mauricio Agustin Riguera		
Brgy Pulang Lupa Dos	Kap. Teodoro Quilatan		
Brgy Talon Uno	Kap. Emiliano Ramos		
Brgy. Talon Dos	Kap. Ruben Sanchez		
Brgy. Talon Singko	Kap. Josefina Bumanlag		
DASMARIÑAS CITY			
Mayor's Office	Hon. Elpidio F. Barzaga, Jr.	Don P. Campos St. Brgy 4 Dasmariñas City, Cavite	046.416.3941 046.416.3942 046.416.0095
Vice Mayor's Office	Hon. Raul Rex D. Mangubat		
Chairman, SP Committee on Environment			
Chairman, SP Committee on Infrastructure			
City Planning Office	Engr. Moises C. Menguito	cityplanning_dasmacity@yahoo.com	046.850.0656
Traffic Management Bureau			
City ENRO			
City Engineering			
Brgy. Paliparan 1	Kap. Remigio Beberino Sec. Princess Joy Candaba	nhoraly21@gmail.com	0917.168.2949 0907.032.1442
Brgy. Paliparan 2	Kap. Ernesto Santos Treas. Lisa Hormillosa		046.402.5332 0929.267.3795
Brgy. Paliparan 3	Kap. Eleuterio Guimbaolibot Sec. Jeanrose Garabiles	brgy.paliparan3@gmail.com bGarabiles@gmail.com	0929.813.9009 0915.349.9192
Brgy. Salawag	Kap. Victor O. Topacio Sec. Josefina V. Acosta		0921.573.7890 0945.465.0988
PCCI – Cavite	Ms. Teresita M. Leabres		046.870.2999

1 Documentation of IEC Campaign

1.1 Signature Sheets of LGU Officials during Courtesy Visits and Key Informant Interviews

Information, Education and Communication Campaign for the Proposed LRT-6 Phase 1 Project
Parañaque City

Date	Name of Office	Name of Representative	Signature
24 Oct 18	MAYOR'S	CATHY BONSOL	
24 OCT 18	PIO/SSD	BRENDA F. JIMENEZ	
24 OCT 18	BUSA	ELLEN RAMOS	
24-10-18	BRGY SAN ISIDRO	ALFREDO AGOR	
	BRGY SAN DIONISIO	KGD MELENCIO SANTOS	
	BRGY STO. NIÑO	JOHNNY CO	
10-24-18	BGY. LA HUERTA	ORLANDO TRECENO	
10-24-18	Brgy. BF Homes	Excelle Nillar	

Information, Education and Communication Campaign for the Proposed LRT-6 Phase 1 Project
Muntinlupa City

Date	Name of Office	Name of Representative	Signature
25 Oct 2018	Office of City Administrator, Muntinlupa	Roger John P. Smith	
	CPDO - Muntinlupa	Jose Mari Adriano	
	Mutong Sevilla		
	Marilou Ampaya for Mayor Jaime Fresnedi		
11-11-2018	Hermie P. Filson	Barangay Sucat	
11/12/18	LGBC	Brgy. Alabang	(892-94-68)
"	Brgy Ayala Alabang	Dodie Matanguihan	
	Poe P. Royz / Brgy. Ayala Alabang	Poe P. Royz	
	Brgy. Cupang	Aaron Aquino	
	Brgy. Cupang	Topher Arevalo	
11-12-18	Brgy. Cupang	Anna B. Arcita - Asst. Sec.	
	Brgy. Cupang	Sec. Mc John Nicolas	
	Brgy. Cupang	Kgd. Allan Loresca	
	Brgy Cupang	Anna C. Soriano	
	Brgy. Cupang	Davis E. Methuen	
	Brgy. Cupang	A. Hy A. Sicat	
	Brgy. Cupang	Marlet Fliga	
	Brgy. Cupang	Aaron M. Aquino	
	Brgy. Cupang	Topher Arevalo	
	Brgy. Alabang	Floyd Rezponte	
	MTMB - Office (Alabang, Munt)	Bertolano, Juanito M.	

Information, Education and Communication Campaign for the Proposed LRT-6 Phase 1 Project
Bacoor City

Date	Name of Office	Name of Representative	Signature
11/14/18	CPDC-Bacoor	Jesus Francisco	
11/14/18	Admin's Office	Atty. Roy Aleng	
11/14/18	Barangay Affairs Office	Elmer G. Jimenez	
11/14/18	BRGY. TALABA 4	Julita Arega	
11/14/18	Brgy - Molino 3	Apolonio T. Aquino Jr	
11/14/18	Brgy. Molino 3	Michael E. Bautista	
11/14/2018	Brgy. Molino 3	Ma. Josie A. Cricte	
11/15/18	Molino 6	Ronald Javier	
11/15/18	Molino 6	Roberto C. Cruz	
11/15/18	Bgmo	Adel Ud Ahube	
11/15/18	Molino 4	Jeffrey P. Campana	
11/15/18	Molino III	Pastor B. Sageses	
11/15/18	Molino I	Teo M. Dominguez	
11/15/18	Molino I	Arlene G. Ramos	
11/16/18	San Nicolas III	George Gawaran	
11/16/18	San Nicolas III	Priscilla C. Orig	
11/16/18	Bayanan	Alfie Gawaran	
11/16/18	Molino II	P/O Mike Sabuitad	
11-16-18	Ligas III	P/O. Pablo N. Morales	
11-16-18	San Nicolas II	Kap. Edgardo G. Pantoni	
11-16-18	San Nicolas II	Ex-O Silvestre Solis	
11/16/18	San Nicolas I	Kap. Sonny Boy Francisco	
11/16/18	San Nicolas I	Sec. Alan Alvarez	
11/16/2018	San Nicolas I	Treas. Renato Ordoñez Jr	
11/16/2018	Ligas 2	Treasurer Victorino Pascual	
11/16/18	Ligas 2	Jose T. Delantino	
11/16/18	Ligas 2	Jose V. Quinto	

Information, Education and Communication Campaign for the Proposed LRT-6 Phase 1 Project
Dasmariñas City

Date	Name of Office	Name of Representative	Signature
11/28/18	DASMARIÑAS CITY ASSESSOR	ENER MILONGO LOUDATO	
	DASMARIÑAS CITY MAYOR	MAYOR ELPIDIO BARZAGA JR.	
	DASMARIÑAS CITY ADMIN.	ATTY. AISA SANGO	
	Brgy. Paliparan 3	Jeanerose P. Garabiles	
	Paliparan II	Analiza A. Hornillosa	
	Paliparan I	PRINCESS JOI CANDABA	
	PALIPARAN I	NORALY CHUA	
	Salawag	Brgy. TREASURER	11-28-18
		kristhian James P. Villamin	
12/4/18	PALIPARAN II	P.B ERNESTO A SIMANG	12-04-18
	PALIPARAN II	FERNANDO R. PUNZALAN	12-04-18
	PALIPARAN I	PERFECTO P. BEBERINO	12-04-18

LAS PIÑAS our home

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)
FOR THE LRT-6 PHASE 1 PROJECT
04 December, 2018
Max's Restaurant, 268 Alabang-Zapote Road, Pamplona Dos, Las Piñas City

ATTENDANCE SHEET

	NAME	OFFICE	POSITION	CONTACT NO.	SIGNATURE
1	HON. HENRY C. MEDINA	SANGGUNIAN PANGLUNGSOD	CITY COUNCILOR		
2	ENGR. ROSABELLA BANTOG	OFFICE OF THE CITY ENGINEER	CITY ENGINEER		
3	MR. REYNALDO BALAGULAN	OFFICE OF THE CITY MAYOR	CITY ADMINISTRATOR		
4	ENGR. LEONIDA A. LAGRISOLA	CITY PLANNING & DEVELOPMENT OFFICE	CITY PLANNING OFFICER		
5	HON. BONIFACIO M. RAMOS	BRGY. ALMANZA UNO	BRGY. CAPTAIN	RAMON M. RACELA BRGY. SECRETARY	
6	HON. FELIMON A. AGUILAR JR.	BRGY. BF INTERNATIONAL	BRGY. CAPTAIN	ROGER D. ORDINA ADMIN	
7	HON. MARK G. NERY	BRGY. MANUYO DOS	BRGY. CAPTAIN		
8	HON. RUBEN Y. SANCHEZ	BRGY. TALON DOS	BRGY. CAPTAIN		
9	HON. JOSE MAURICIO AGUSTIN R. RIGUERA	BRGY. PAMPLONA TRES	BRGY. CAPTAIN	09176348897	KGWD ROMY Bautista
10	HON. TEODORO R. QUILATAN	BRGY. PULANGLUPA DOS	BRGY. CAPTAIN		
11	HON. EMILIANO B. RAMOS	BRGY. TALON UNO	BRGY. CAPTAIN		
12	HON. JOSEFINA B. BUMANLAG	BRGY. TALON SINGKO	BRGY. CAPTAIN		
13	ENGR. ARMANDO Q. AGUILAR	CITY PLANNING & DEVELOPMENT OFFICE	PROJECT DEV'T. OFFICER III	872-0921	
14	MR. ROGER CAPIÑA	BRGY. BF INTERNATIONAL	BRGY. ADMIN		
15	KGD. NOELITO PALLARCA	BRGY. MANUYO DOS	BRGY. KAGAWAD		

LAS PIÑAS our home

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)
FOR THE LRT-6 PHASE 1 PROJECT
04 December, 2018
Max's Restaurant, 268 Alabang-Zapote Road, Pamplona Dos, Las Piñas City

ATTENDANCE SHEET

	NAME	OFFICE	POSITION	CONTACT NO.	SIGNATURE
16	KGD. ROMY BAUTISTA	BRGY. PAMPLONA TRES	BRGY. KAGAWAD		
17	KGD. SUSAN BOROMEO – GEBAGE N. ZUNIGA	BRGY. PULANGLUPA DOS	BRGY. KAGAWAD	0975-2829424	
18	KGD. ~~ANTONIO V. RAMOS~~	BRGY. TALON UNO	BRGY. KAGAWAD	8020911	
19	KGD. DEO AGUINALDO	BRGY. TALON DOS	BRGY. KAGAWAD	0917 526 9565	
20	KGD. ROGELIO MORAL	BRGY. TALON SINGKO	BRGY. KAGAWAD		
21	KGD. ROSALIE AGUILAR	BRGY. PULANGLUPA DOS	BRGY. KAGAWAD	0917-9907665	
22	ARMIE JEAN H. PEREZ	SEASTEMS, INC.	Environmental Consultant	9301706	
23	Ma. Theresa T. Aparente	"	Social Specialist	09215558359	
24	MA. ARMIA PEREZ	PAVI		09176311743	
25	TONY TAN				
26	Anna E. Nacu	Seastems, Inc.	ENVI. CONSULTANT	0917 840.7192	
27	Eron Moyot	Manuyo Y	Kagawad	09199450531	
28	NOELITO PALLARCA	MANUYO 2	KAGAWAD	09338227155	
29	MR. HOMAR SANTOS				
30	Nichael Jr.	PAVI	Rep.	09178793271	

1.2 Photographs taken during Courtesy Visits and Key Informant Interviews

Parañaque City	
 Courtesy visit with Mayor Edwin Olivarez	 Courtesy visit with Barangay San Isidro Brgy. Capt. Noel Japlos and Brgy. Adm. Alfred Agor
 Courtesy visit with Brgy. San Dionisio Kagawad Melencio Santos	 Courtesy visit with Brgy. Sto. Niño Capt. Johnny Co
 Courtesy visit with Brgy. La Huerta Adm. Orlando Tuscano	

 Courtesy visit and project presentation to Barangay Council of Cupang	
Bacoor City	
 Courtesy visit and project presentation to Talaba IV Brgy. Capt. Julieto Arcega	 Courtesy visit and project presentation to Molino III barangay officials

APPENDIX 7. INITIAL RESULTS OF PERCEPTION SURVEY DURING THE LRT 6 IEC.

The Information-Education-Communication (IEC) Campaign for the LRT-6A + LRT-6B+C Project covered the five impact cities and 35 impact barangays of the project alignment. The consultant and stakeholder representatives were able to talk to a total of 127 stakeholder representatives mostly from LGU offices of the five host cities and 35 host barangays. Among the five host cities, all except Muntinlupa were already aware about the project through information disseminated by the project proponent. All host barangays in Parañaque City were already aware about the project but the host barangays of other host cities were not yet aware about the project alignment. All the representatives of the host cities and barangays welcome the project and are eagerly awaiting project implementation to ease traffic congestion in their areas (**Table 1**). Issues and concerns raised during the IEC are summarized in **Table 2**. Stakeholders foresee no major negative impacts from the project.

Table 1. Analysis of Stakeholder Perception about the LRT-6A + LRT-6B+C Project

Stakeholder Representative	No. of Respondents	Awareness about the Project		Source of Information	Do you want project to proceed?	
		Yes	No		Yes	No
Parañaque City LGU	3	✓		Proponent	✓	
Barangay San Antonio	3	✓		Mayor's Office	✓	
Barangay San Isidro	3	✓		Mayor's Office	✓	
Barangay San Dionisio	3	✓		Mayor's Office	✓	
Barangay Sto. Nino	2	✓		Mayor's Office	✓	
Barangay La Huerta	1	✓		Mayor's Office	✓	
Barangay BF Homes	1	✓		Mayor's Office	✓	
Muntinlupa City LGU	4		✓		✓	
Barangay Sucat	2		✓		✓	
Barangay Alabang	2		✓		✓	
Barangay Ayala Alabang	3		✓		✓	
Barangay Cupang	9		✓		✓	
Bacoor City LGU	5	✓		Proponent	✓	
Barangay Talaba IV	2		✓		✓	
Barangay Molino III	5		✓		✓	
Barangay Molino VI	9		✓		✓	
Barangay Molino IV	3		✓		✓	
Barangay Niog III	2		✓		✓	
Barangay Molino I	2		✓		✓	
Barangay San Nicolas III	4		✓		✓	
Barangay Bayanan	2		✓		✓	
Barangay Molino II	2		✓		✓	
Barangay Ligas III	2		✓		✓	
Barangay San Nicolas II	2		✓		✓	
Barangay San Nicolas I	3		✓		✓	
Barangay Ligas II	3		✓		✓	
Las Piñas City LGU	3	✓		Proponent	✓	
Host Barangays	30		✓		✓	
Dasmariñas City LGU	3	✓		Proponent	✓	
Barangay Salawag	2		✓		✓	
Barangay Paliparan III	1		✓		✓	
Barangay Paliparan II	3		✓		✓	
Barangay Paliparan I	3		✓		✓	
	127					

Table 2. Summary of Issues and Concerns Raised during the IEC for LRT-6Z and LRT-6B+C Project

Issues and Concerns	Parañaque	Muntinlupa	Las Piñas	Bacoor	Dasmariñas
Project Description					
Project stage and completion date		✓	✓		
Project alignment has sharp curves				✓	✓
No problem with project alignment since structure is elevated and will be built on center island				✓	
Why is project alignment off the road?				✓	✓
Why does alignment not pass through Aguinaldo Highway?					✓
Exact location of project alignment				✓	✓
Constructing piers on road will decrease road width				✓	✓
Consider electricity posts on both sides of the road				✓	
Structure might collapse on houses				✓	
Consider other infrastructure and development projects in the city			✓	✓	✓
Air					
Noise impact especially at night	✓			✓	
People					
Officials were already aware about the project	✓			✓	
LGU welcomes the project	✓	✓	✓	✓	✓
Jeepney operators and drivers associations, business establishments, subdivisions and affected schools should be invited to the public scoping	✓	✓	✓	✓	✓
Expansion of business opportunities is foreseen		✓			
Increased daytime foot traffic and business activity is expected		✓			
Traffic impact during construction is expected	✓	✓	✓	✓	✓
Project will ease traffic problem		✓	✓	✓	✓
Subsequent road widening will affect houses along the road				✓	✓
Avoid ROW acquisition on private properties				✓	
Will project contribute to barangay IRA?				✓	
Project will shorten travel time to Metro Manila					✓
Rerouting will be necessary during construction				✓	
Access of residents will be hampered during construction				✓	
Others					
Project will improve transport system	✓	✓	✓		
Proper spoils management during construction	✓				
Project will augment needed road infrastructure		✓	✓		
No major negative impact is foreseen			✓	✓	

Appendix 8. List of Invitees for Public Scoping.

No.	Office	Name of Contact Person	Address / Email	Contact No.
	National Government Agencies/Other Stakeholders			
1.	DENR EMB Central Office	Dir. Metodio U. Turbella EMB Director	DENR Compound Visayas Ave., Quezon City	02.927.1517 02.928.3725
2.	DENR EMB Central Office	Engr. Esperanza A. Sajul Chief, EIAMD	DENR Compound Visayas Ave., Quezon City	02.920.2240
3.	DENR EMB NCR	Atty. Domingo M. Clemente, Jr. EMB Regional Director	National Ecology Center, East Avenue, Diliman, Quezon City	02.515.0683
4.	DENR EMB NCR	Mr. Wilfredo R. Rafanan Chief, Clearance & Permitting Div.	National Ecology Center, East Avenue, Diliman, Quezon City	02.931.2397 02.931.2954/1834
5.	DENR EMB Calabarzon	Dir. Noemi A. Paranada EMB Regional Director	1515 L& S Building, DENR by the Bay Roxas Blvd., Ermita, Manila	02.536.2808
6.	DENR EMB Calabarzon	Mr. Robert Angelo M. Metin OIC, Clearance & Permitting Division	1515 L& S Building, DENR by the Bay Roxas Blvd., Ermita, Manila	02.522.8177
7.	Department of Transportation	Atty. Timothy John R. Batan OIC Undersecretary for Rail and Toll Roads	tj.batan@dotr.gov.ph Unit 2530 Apo Court Along Sergio St. Clark Freeport Zone, Pampanga	TL 790.8300/8400 Local 706
8.	Department of Transportation	Engr. Joel R. Magbanua Division Chief Rail Transport Planning	Room 67 The Columbia Tower Brgy. Wack-wack, Ortigas Avenue Mandaluyong City	TL 790.8300/8400 Local 744/343 726.6648
9.	MMDA	Dir. Ma. Josefina J. Faulan Metropolitan Development Planning Service	MMDA Building EDSA corner Orense Street Guadalupe Nuevo, Makati City	882.4151 to 77 local 1097
10.	MMDA	Asec. Roberto T. Almadin AGM for Operations	MMDA Building EDSA corner Orense Street Guadalupe Nuevo, Makati City	882.0916 882.4151 to 77 local 1061
11.	Light Rail Transit Authority	Ms. Eleanore T. Domingo Planning Department Ms. Eleanor C. Palaypayon Line 1 South Extension PM	LRTA Compound, Marcos Highway, Santolan, Pasig City	02.647.3490 to 91 local 29965
12.	National Grid Corporation of the Philippines	Operations and Maintenance Division	Quezon Avenue cor. BIR Road Diliman, Quezon City corpcomm@ngcp.ph	02.863.7221 02.863.7100
13.	Manila Electric Company	Electric Distribution and Development Division	Meralco Center Ortigas Avenue, Pasig City	

No.	Office	Name of Contact Person	Address / Email	Contact No.
	PARAÑAQUE CITY			
1.	Mayor's Office	Hon. Edwin L. Olivarez Cathy Bonsol (Secretary) invitation.melo@yahoo.com	Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	02.820.7783 02.624.9623 0917.519.8677
2.	Vice Mayor's Office	Hon. Rico T. Golez	Legislative Building Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	
3.	Congressman 1st District	Hon. Eric Olivarez	Legislative Building Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	
4.	Cong. 2nd District	Hon. Gustavo Tambunting	Paranaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	
5.	Chairman, SP Committee on Environment		Legislative Building Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	
6.	Chairman, SP Committee on Infrastructure		Legislative Building Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	
7.	City Administrator	Mr. Fernando Soriano Cathy Amanio (Secretary)	Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	02.820.7783 541.0226 (F) 0917.630.6519
8.	City Planning Office	Engr. Jun Rivera	Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	
9.	City TMO	Mr. Teodorico Barandino	Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	
10.	City ENRO	Bernardo N. Amurao	Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	02.829.8701 02.826.6147
11.	City Engineering	Engr. Aser S. Mallari	Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	02.826.8272 02.478.8596 02.829.3077
12.	City Information Office	Mr. Mario L. Jimenez	Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	02.829.0866
13.	Police Station	PS/Supt. Leon Victor Z. Rosete	Parañaque City Police Station Old Sucat Road, Parañaque City	02.286.2877
14.	ABC President	Hon. Chris Aguilar Brgy. Marcelo Green	Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	
15.	President, Senior Citizen's Association		Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	
16.	SK Chairman		Parañaque City Hall San Antonio Avenue Brgy. San Antonio, Parañaque City	
17.	Paranaque Transport Group	Makati Ayala Bicutan Sucat UV Express Operators Drivers Association, (MABSUVEODA) Inc.	9 Kuwait St. Annex 37 Better Living, Parañaque City	
18.	Brgy. BF Homes	Hon. John Paolo N. Marquez Brgy Sec. Excel Nillar	2B Elsie Gaches St. BF Homes, Paranaque City	659.2789/809.8843 0935.197.0138

No.	Office	Name of Contact Person	Address / Email	Contact No.
19.		Manila Memorial Park and Crematory	Dr. A. Santos Avenue Parañaque City	02.820.2392
20.		Teoville Subdivision HOA	No.7 Magdalena St., President's Avenue, BF Homes, Parañaque City	
21.		SM City BF Parañaque	Tooville Subdivision Dr. A. Santos Avenue cor. President's Avenue Parañaque City	02.808.6279
22.		Loyola Memorial Chapels and Crematorium	Dr. A. Santos Avenue Parañaque City	02.826.7014
23.		Goodwill 2 Subdivision	Dr. A. Santos Avenue BF, Parañaque City	0917.436.8809
24.		Mondelez International	Dr. Arcadio Santos Avenue BF, Parañaque City	0923.415.8745
25.		St. James College	Dr. A. Santos Avenue Parañaque City	
26.	Brgy. La Huerta	Hon. Peter Augustine N. Velasco Brgy. Adm. Orlando G. Tuscano	 buboytuscano@yahoo.com	829.6152/825.6048 0917.310.0157
27.	Brgy. San Antonio	Hon. Leopoldo C. Casale Brgy. Sec. Jomar F. Eugenio Brgy. Adm. Celeste Kibanoff Brgy. Asst. Sec. Jellyn Bautista	0927.957.1943	467.1004/935.3071 0936.164.7043
28.		San Antonio Valley HOA	San Antonio Valley Parañaque City	
29.		Fourth Estate Subdivision HOA	San Antonio, Parañaque City	
30.		Mon El Subdivision HOA	Dr. A. Santos Avenue Parañaque City	
31.		Medical Center Paranaque	Dr. A. Santos Avenue San Antonio, Parañaque City	02.820.0290
32.		Unihealth Parañaque Hospital & Medical Center	Dr. A. Santos Avenue San Antonio, Parañaque City	02.832.0636
33.		Uniwide	Dr. A. Santos Avenue Parañaque City	
34.		Ramon Pascual Institute	Dr. A. Santos Avenue Parañaque City	02.825.9236
35.		Elorde Sports Center	Dr. A. Santos Avenue Parañaque City	02.846.4463
36.		Shopwise Sucat	Dr. A. Santos Avenue Parañaque City	02.852.0354
37.		San Antonio High School	Dr. A. Santos Avenue Parañaque City	
38.	Brgy. San Dionisio	Hon. Pablo R. Olivarez, MD Brgy. Adm. Erlinda Bernardo Kag. Melencio Santos Engr. Saporna (Brgy Engg Office)	San Dionisio Barangay Hall Dr. A. Santos Avenue Parañaque City	813.3223/3252 0917.808.8929 0915.543.9770 824.6279
39.		San Dionisio Elementary School	Kabihasnan Road, Parañaque City	02.832.7481
40.		Datamex Institute of Computer Technology	8145 LE Gatch Building Dr. A. Santos Avenue Parañaque City	0947.179.7761
41.		SM City Sucat	Dr. A. Santos Avenue Parañaque City	02.829.8816
42.		AMA Computer University	8262 Dr. A. Santos Avenue San Isidro, Parañaque City	02.826.6603
43.		Gatchalian 1 Subdivision HOA	San Dionisio, Parañaque City	
44.		Olivarez College	Dr. A. Santos Avenue Parañaque City	02.826.0750
45.		Olivarez General Hospital	Dr. A. Santos Avenue	02.826.7966

No.	Office	Name of Contact Person	Address / Email	Contact No.
			Parañaque City	
46.		Liana's Shopping Mall and Supermarket	Dr. A. Santos Avenue Parañaque City	0916.103.1779
47.		Avida Towers Sucat	Dr. A. Santos Avenue Parañaque City	02.848.5200
48.	Bgy. San Isidro	Hon. Noel P. Japlos Brgy. Adm. Alfred Agor Brgy. SWM Consultant Milou Carlos	San Isidro Barangay Hall Dr. A. Santos Ave., Parañaque City miloucarlos@gmail.com let.carlos1@gmail.com	788.0356 09062551216 0918.926.6896
49.		Universal College	8273 Dr. A. Santos Avenue San Dionisio, Parañaque City	02.820.2222
50.		Fortunata Village Garden City Subdivision 1 & 3 HOA	67 Kabesand Segundo St. San Isidro, Parañaque City	
51.		Greenheights Village HOA	San Isidro, Parañaque City	
52.		Topland Subdivision	Topland Drive, Parañaque City	0917.357.8345
53.		Waltermart Sucat	Dr. A. Santos Avenue Parañaque City	02.998.4587
54.		SM Hypermart Sucat	Dr. A. Santos Avenue Parañaque City	
55.	Brgy. Sto. Niño	Hon. Johnny C. Co	Sto. Niño Barangay Hall J.P. Rizal Street, Sto. Niño Parañaque City	02.852.0128 02.852.7477

No.	Office	Name of Contact Person	Address / Email	Contact No.
	MUNTINLUPA CITY			
1.	Mayor's Office	Hon. Jaime R. Fresnedi	2F Muntinlupa City Hall, National Road, Putatan, Muntinlupa City	02.862.2525 local 142-143, 135 02.862.6436
2.	Vice Mayor's Office	Hon. Celso C. Dioko	Legislative Building, National Road Putatan, Muntinlupa City	
3.	Chairman, SP Committee on Environment	Hon. Marissa C. Rongavilla District 2	Legislative Building, National Road Putatan, Muntinlupa City	
4.	Chairman, SP Committee on Infrastructure	Hon. Luisito A. Arciaga District 1	Legislative Building, National Road Putatan, Muntinlupa City	
5.	City Administrator	Mr. Engr. Allan A. Cachuela Mr. Roger John Smith (Deputy)	2F Muntinlupa City Hall, National Road, Putatan, Muntinlupa City	02.862.2525 L 105/112/147/148 0920.964.1104
6.	City Planning Office	EnP Noel A. Cadorna Jose David E. Adriano	2F Annex Building, Muntinlupa City Hall, National Road, Putatan, Muntinlupa City	02.862.8065 0939.258.3809
7.	Muntinlupa Traffic Management Bureau	Mr. Danidon N. Nolasco	3F Starmall SSH, Alabang, Muntinlupa officialmtmb@gmail.com	831.9884
8.	City ENRO	Ms. Lorna B. Misa	5F Annex Building	02.861.9937
9.	City Engineering	Engr. Dynadelle N. Aranda	2F Main Building, Muntinlupa City Hall, National Road, Putatan Muntinlupa City	02.862.2525 local 170-172, 164-175
10.	Police Station	PS/Supt. Nicolas Salvador	Centennial Avenue cor. Laguerta, Tunasan, Muntinlupa City	02.862.2611 0908.377.0084
11.	President, Senior Citizens Association		Muntinlupa City	
12.	SK Chairman		Muntinlupa City	
13.	Transport Group	Metropolis Alabang Pasay Jeepney Operators, Drivers and Dispatcher's Association, Inc. (MALPAJODAI)	112 A. Bunye St. Alabang, Muntinlupa	
14.	Barangay Alabang	PB Hon. Christine May A. Abas Brgy. Sec. Floyd Joseph Reynante	Alabang Barangay Hall Montillano St. Alabang, Muntinlupa bagongalabang.muntinlupa @ gmail.com	0956.645.0402
15.		Filinvest Alabang	Vector One Building, Northgate Ave. Alabang, Muntinlupa	02.846.0278
16.		South Station Transport Terminal	Spectrum Midway Extension corner Corporate Avenue, Alabang, Muntinlupa	
17.		Skyway O&M Corporation	Skyway Building, Toll Operations Complex, Doña Soledad Avenue., Better Living Subdivision, Parañaque	02.875.9929
18.	Barangay Ayala Alabang	PB Hon. Ruben P. Baes	Barangay Office, Narra Street, Ayala-Alabang, Muntinlupa City	02.807.2472
19.		Alabang Town Center	Alabang-Zapote Road, Ayala Alabang Muntinlupa City	02.842.2782
20.		Molito Lifestyle Center	Madrigal Avenue, Ayala Alabang Muntinlupa City	02.808.6401
21.		Madrigal Business Park	Alabang-Zapote Road, Ayala Alabang Muntinlupa City	02.843.4473
22.	Barangay Cupang	PB Hon. Rainier Emmanuelle B. Bulos Brgy. Sec. Mc John Nicolas	Cupang Barangay Hall M.L. Quezon Street, Cupang Muntinlupa City	02.850.6474
23.		Pacific Village	Alabang Zapote Road Cupang, Muntinlupa	0917.555.6584
24.		San Jose Village	Cupang, Muntinlupa	
25.		Alabang Medical Center	8 Corregidor Street	02.850.8719

No.	Office	Name of Contact Person	Address / Email	Contact No.
			Cupang, Muntinlupa	
26.		Rev. Dom Clement Ma. Roque Rector-President San Beda College Alabang	8 Don Manolo Boulevard Cupang, Muntinlupa	02.236.7222
27.	Barangay Sucat	PB Hon. Rafael T. Sevilla	Dir. A. Bunye Avenue Sucat, Muntinlupa sucat.muntinlupacity@gmail.com	02.553.9390 to 91
28.		Philippine National Construction Corporation	Km 15 PNCC Compound, E. Service Road, Parañaque City	02.846.3045
29.		Posadas Village HOA	Mayor J. Posadas Avenue Sucat, Muntinlupa	02.837.0308
30.		Dona Remedios Heights Subdivision HOA	Sucat, Muntinlupa	
31.		Lake Front Development	Lakefront, Sucat, Muntinlupa	02.226.3552 02.837.1400 02.794.9999
32.		Jeepney Operators and Drivers Association	Sucat, Muntinlupa	

No.	Office	Name of Contact Person	Address / Email	Contact No.
	BACOOR CITY			
1.	Mayor's Office	Hon. Lani M. Revilla	Bacoor City Hall, Molino Boulevard, Bacoor, Cavite mlmroffice@gmail.com	046.481.4140
2.	Vice Mayor's Office	Hon. Karen S. Evaristo	Bacoor City Hall, Molino Boulevard, Bacoor, Cavite	046.481.4137
3.	Congressman	Hon. Strike B. Revilla	Bacoor City Hall, Molino Boulevard, Bacoor, Cavite	
4.	Chairman, SP Committee on Environment		Bacoor City Hall, Molino Boulevard, Bacoor, Cavite	
5.	Chairman, SP Committee on Infrastructure		Bacoor City Hall, Molino Boulevard, Bacoor, Cavite	
6.	City Administrator	Mr. Jerome Oliveros Atty. Roy Cheng	Bacoor City Hall, Molino Boulevard, Bacoor, Cavite	046.481.4142
7.	City Planning Office	Engr. Jesus D. Francisco	Bacoor City Hall, Molino Boulevard, Bacoor, Cavite mpdc_bacoor@yahoo.com cpdcbacoor@gmail.com jessfran625@gmail.com	046.481.4100/315 046.434.6616
8.	Barangay Affairs Office	Mr. Elmer Jimenez	Bacoor City Hall, Molino Boulevard, Bacoor, Cavite elmerjiii@gmail.com elmerjiii@yahoo.com	0956.746.2279
9.	Bacoor Traffic Office	Geronimo del Rosario Adel Udarbe	Bacoor City Hall, Molino Boulevard, Bacoor, Cavite btmdbacoor@gmail.com	046.481.4100 L 233 0998.557.3097
10.	City ENRO		Bacoor City Hall, Molino Boulevard, Bacoor, Cavite	046.481.4128
11.	City Engineering		Bacoor City Hall, Molino Boulevard, Bacoor, Cavite	046.481.4134
12.	ABC President	Hon. Reynaldo Palabrica	Queen's Row Central	0998.567.6237
13.	President of Senior Citizen's Organization		Bacoor, Cavite	
14.	SK Chairman		Bacoor, Cavite	
15.	Brgy. Ligas 2	Kap. Delfin Pascual Sec. Jose V. Guinto	Ligas 2 Barangay Hall Molino Road, Bacoor, Cavite ligas2bacoorcavite@gmail.com	046.417.7787 0922.449.4587
16.		F&E De Castro Village HOA	F&E De Castro Village Bacoor, Cavite	
17.		Coastal Wood Subdivision HOA	Ligas II, Bacoor, Cavite	
18.		Wood Crest Subdivision HOA	Ligas II, Bacoor, Cavite	
19.	Brgy. Ligas 3	Kap. Pablo N. Morales Sec. Heidi Mendoza	Ligas 3 Barangay Hall Molino Road, Bacoor, Cavite ligas3barangay@gmail.com heidiycelmendoza@yahoo.com	0947.1013219
20.		Casimiro Westville Homes HOA (Phases 1 to 5)	LIgas III, Bacoor, Cavite	
21.	Brgy. San Nicolas 1	Kap. Sonny Boy Francisco Sec. Allan Allanigue	San Nicolas 1 Barangay Hall Molino Road, Bacoor, Cavite brgy.sannicolas1@gmail.com	0919.426.9212 0935.555.5846
22.	Brgy. San Nicolas 2	Kap. Edgardo G. Pantoni Brgy ex-o Rodel S. Solis	San Nicolas 2 Barangay Hall Molino Road, Bacoor, Cavite sannicolas2bacoor@gmail.com	0908.626.6362 0918.579.5310
23.		Camella Homes Lessandra HOA	Molino Road, Bacoor, Cavite	02.531.5670
24.		Camella Homes Altea HOA	Molino Road, Bacoor, Cavite	0915.688.7591
25.	Brgy. San Nicolas 3	Kap. George G. Gawaran	San Nicolas 3 Barangay Hall	

No.	Office	Name of Contact Person	Address / Email	Contact No.
		Sec. Priscilla Orig	Bacoor, Cavite itchieorig@yahoo.com.sg	0929.876.6342
26.	Brgy. Molino 1	Kap. Jeo Dominguez Sec. Arlene Ramos	barangaymolino1@gmail.com	0921.795.5433 0920.658.4844
27.		Progressive Village HOA	Molino Road, Bacoor, Cavite	
28.		Green Breeze Village HOA	Molino Road, Bacoor, Cavite	
29.	Brgy. Molino 2	Kap. Michael J. Saquitan Sec. Gracia Baria Asst. Sec. Genesis Ventura	Molino 2 Barangay Hall Molino Road, Bacoor, Cavite barangaymolinoii@gmail.com	0908.988.1431 0919.812.5175 0906.095.2898
30.		Mission to the World Philippines Foundation, Inc.	Lot 1, Block D, Progressive 8 Molino 2, Bacoor, Cavite	046.484.0328
31.		St. Michael Medical Hospital	Molino Road, Bacoor, Cavite	046.477.1707
32.		RFC Molino Mall	L11, G/F RFC Mall, Molino, Bacoor	
33.	Brgy. Molino 3	Kap. Apolonio I. Advincula, Jr. Brgy Sec Ambrosio Esguerra Kag. Michael Bautista (Sanitation and Environment Committee) Kag. Josie Criste (Social Welfare and Culture Committee)	Molino 3 Barangay Hall Molino Road, Bacoor, Cavite brgy.molino3@gmail.com	046.477.1959 0926.277.7282
34.		Molino Elementary School	Molino Road, Molino 3 Bacoor, Cavite	046.477.1710
35.		Southeast Asian Medical Center	Molino Road, Molino III Bacoor, Cavite	046.431.0000
36.		University of Perpetual Help	Molino Road, Bacoor, Cavite	046.477.1630
37.		St. Thomas More Academy Philippines	Avenida Rizal, Molino III Bacoor, Cavite	
38.		Wood Estate Village II HOA	Molino III, Bacoor, Cavite	0975.257.7682
39.		Statefields School	Molino Road, Bacoor, Cavite	046.872.3281
40.		Citta Italia HOA	Bacoor, Cavite	0928.382.8983
41.		Progressive Village 14 HOA	Molino Road, Bacoor, Cavite	
42.		Lynville Subdivision HOA	Molino III, Bacoor Cavite	
43.		Town and Country West Subdivision HOA	4102 Molino Road, Bacoor, Cavite	046.517.0725
44.		Melrose Park Subdivision HOA	Molino III, Bacoor, Cavite	
45.		Villa Cristorey Subdivision HOA	Molino 3, Bacoor, Cavite	
46.		Camella Springville Subdivision HOA	Daang Hari Road, Bacoor, Cavite	0920.985.8888
47.		Camella Springville TODA Multipurpose & Transport Services Cooperative	National Road, Molino III Bacoor, Cavite	046.572.5039
48.		Molino-Alabang UV Express Terminal	Molino Road, Bacoor, Cavite	
49.		Molino Homes I Subdivision HOA	Molino Road, Bacoor, Cavite	
50.		Molino-Ayala Makati UV Express Terminal	Molino Road, Bacoor, Cavite	
51.		Molino Homes Tricycle Operators & Drivers Association	Block 18, Lot 6 Molino Homes 1 Molino 3, Bacoor, Cavite	
52.	Brgy. Molino 4	Kap. Jeffrey P. Campaña Kag. Wilfredo Tating	Molino 4 Barangay Hall Molino-Paliparan Road Bacoor, Cavite brgymolinokwatro2018@gmail.com	046.477.1530 0917.244.4553
53.		Vista Mall Daang Hari	Molino-Paliparan Road Molino IV, Bacoor, Cavite	046.437.7781
54.		Camella Cerritos Heights Daang Hari HOA	Cerritos Heights, Michigan St. Molino IV, Bacoor, Cavite	0918.964.0565
55.		Camella Lessandra Heights HOA	Daang Hari, Molino IV Bacoor, Cavite	0917.937.3514
56.	Brgy. Molino 6	Kap. Ronaldo Javier	Molino 6 Barangay Hall	

No.	Office	Name of Contact Person	Address / Email	Contact No.
		Sec Roberto Cruz	Soldiers Hills Subdivision Bacoor, Cavite cruz.roberto85@yahoo.com	0917.891.3312
57.		Soldiers Hills IV Subdivision HOA	Bacoor, Cavite	0917.362.1740
58.		Soldiers Hills II Subdivision HOA	Bacoor, Cavite	
59.	Brgy. Niog 3	Kap. Pastor Sagenes Sec. Annalyn Flores	Niog 3 Barangay Hall Molino Boulevard, Bacoor, Cavite annefranc13@yahoo.com	0908.459.0028
60.	Brgy. Bayanan	Kap. Alfie O. Gawaran Sec. Regie Ugalde	Bayanan Barangay Hall Bayanan Road, Bacoor, Cavite pinagpalangbarangaybayanan @gmail.com	0949.951.8193
61.		Molino Doctor's Hospital	Molino Road, Bayanan Bacoor, Cavite	046.477.0830
62.	Brgy. Talaba IV	Kap. Julieto T. Arcega Sec. Rochelle Reynes	Talaba IV Barangay Hall Emilio Aguinaldo Highway Bacoor, Cavite barangaytalaba4@gmail.com	0922.559.8816 046.519.8206
63.		Talaba Elementary School	66-D Gen. Evangelista St. Bacoor, Cavite	046.417.6491
64.		St. Dominic College of Asia	Emilio Aguinaldo Highway Bacoor, Cavite	046.417.7322
65.		St. Dominic Medical Center	Emilio Aguinaldo Highway Bacoor, Cavite	046.417.2525
66.	KASAMA KA (Molino3)	Mr. Narciso Nato (transport group)	Bacoor, Cavite	

No.	Office	Name of Contact Person	Address / Email	Contact No.
	LAS PIÑAS CITY			
1.	Mayor's Office	Hon. Imelda T. Aguilar	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City imeldaaguilar@gmail.com	02.871.4343 02.871.4345
2.	Vice Mayor's Office	Hon. Luis I. Bustamante	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City	02.776.3515
3.	City Administrator	Mr. Reynaldo C. Balagulan	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City	02.871.4343 02.8714345
4.	Chairman, SP Committee on Environment	Hon. Filemon Aguilar III	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City	
5.	Chairman, SP Committee on Infrastructure	Hon. Danilo V. Hernandez	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City	
6.	Chairman, SP Committee on Planning	Hon. Renan H. Riguera	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City	
7.	City Planning Office	Engr. Leonida Lagrisola City Planning Officer Mr. Arman Aguilar	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City	02.872.0921 0922.814.9227
8.	City Traffic Office	PSupt. Conrado N. Bunyi Chief, Vehicle Traffic Investigation Unit	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City	02.856.3132
9.	City ENRO	Engr. Cesar R. Perillo OIC	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City	02.779.8695
10.	City Engineering	Engr. Rose Bantog	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City	02.873.3004
11.	City Information Office	Mr. Jimmy L. Castillano	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City	02.836.4366
12.	ABC President	Hon. Roberto Cristobal ABC President	Las Piñas City Hall Alabang-Zapote Road, Las Piñas City	02.779.8117
13.	President of Senior Citizens Group		Las Piñas City	
14.	SK Chairman		Las Piñas City	
15.	Transport Group	Las Piñas City Transport Group		
16.	Brgy Almanza Uno	Kap. Bonifacio M. Ramos	Almanza Uno Barangay Hall Las Piñas City	0907.275.4891
17.		SM Southmall	Alabang-Zapote Road, Pilar Village Almanza Uno, Las Piñas City	02.511.4794 02.511.8519
18.		Almanza Square	Almanza Uno, Las Piñas City	
19.		Aragon Building	Almanza Uno, Las Piñas City	
20.		Aurora Arcade	Almanza Uno, Las Piñas City	
21.	Brgy BF International CAA	Kap. Filemon A. Aguilar, Jr.	BF International CAA Barangay Hall 1740 CAA Road, Las Piñas City	
22.		BF Martinville Subdivision HOA	Las Piñas City	
23.		Las Pinas Doctors Hospital	1742 CAA Road, Las Piñas City	02.825.5236
24.		Southville International School and Colleges	1281 Tropical Avenue corner Luxembourg Street, BF Homes International, Las Piñas City	02.825.6374
25.		OB Montessori Center	Las Piñas City	02.820.3011
26.		Casimiro Tricycle Operators and Drivers Association	Las Piñas City	
27.	Brgy Manuyo Dos	Kap. Mark Nery	Manuyo Dos Barangay Hall Las Piñas City	
28.	Brgy Pamplona Tres	Kap. Jose Mauricio Agustin Riguera	Pamplona Tres Barangay Hall Las Piñas City	0917.834.8847
29.	Brgy Pulang Lupa Dos	Kap. Teodoro Quilatan	Pulang Lupa Dos Barangay Hall	

No.	Office	Name of Contact Person	Address / Email	Contact No.
			Las Piñas City	
30.		Citadella Executive Village HOA	Citadella Avenue, Las Piñas City	
31.	Brgy Talon Uno	Kap. Emiliano Ramos	Talon Uno Barangay Hall Las Piñas City	
32.		Robinson's Place Las Pinas	Alabang Zapote Road, Talon Uno Las Piñas City	
33.		Shrine of the Five Wounds of Our Lord Jesus Christ	Las Piñas City	02.801.4020
34.		Las Piñas City Medical Center	1314 Marcos Alvarez Avenue Las Piñas City	02.806.2288
35.		Las Piñas Baptist Church	2 Marcos Alvarez Avenue Las Piñas City	02.801.6789
36.		Moonwalk Village HOA	Las Piñas City	0927.556.1848
37.		Casimiro Village Phase 3 HOA	CAA Road, Talon Uno, Las Piñas City	
38.		Unilever Warehouse	Alabang-Zapote Road, Las Piñas City	
39.		Vita Realty Compound	108 M. Alvarez Street, Las Piñas City	02.805.4396
40.		APT Manufacturing (SMC) Sika Philippines, Inc.	888 Marcos Alvarez Ave. Las Piñas City	02.806.2875
41.		Aspire Manufacturing & Rebuilding, Inc.	2020 Marcos Alvarez Avenue Las Piñas City	02.800.5427
42.				
43.	Brgy. Talon Dos	Kap. Ruben Sanchez	Talon Dos Barangay Hall Las Piñas City	
44.	Brgy. Talon Singko	Kap. Josefina Bumanlag	Talon Singko Barangay Hall Las Piñas City	
45.		Mary Immaculate Parish Nature Church	Apollo III, Moonwalk Village Las Piñas City	
46.		Golden Acres National High School	1 Marcos Alvarez Avenue Las Piñas City	
47.		Golden Acres Elementary School	Las Piñas City	

No.	Office	Name of Contact Person	Address / Email	Contact No.
	DASMARIÑAS CITY			
1.	Mayor's Office	Hon. Elpidio F. Barzaga, Jr. congpidibarzaga@gmail.com	Dasmariñas City Hall Don P. Campos St. Brgy 4 Dasmariñas City, Cavite	046.432.1858 046.416.3941 L110 046.481.4600 L640
2.	Vice Mayor's Office	Hon. Raul Rex D. Mangubat	Dasmariñas City Hall Don P. Campos St. Brgy 4 Dasmariñas City, Cavite	
3.	Chairman, SP Committee on Environment		Dasmariñas City Hall Don P. Campos St. Brgy 4 Dasmariñas City, Cavite	
4.	Chairman, SP Committee on Infrastructure		Dasmariñas City Hall Don P. Campos St. Brgy 4 Dasmariñas City, Cavite	
5.	City Planning Office	Engr. Moises C. Menguito	Dasmariñas City Hall Don P. Campos St. Brgy 4 Dasmariñas City, Cavite cityplanning_dasmacity@yahoo.com	046.850.0656
6.	Traffic Management Bureau		Dasmariñas City Hall Don P. Campos St. Brgy 4 Dasmariñas City, Cavite	
7.	City ENRO		Dasmariñas City Hall Don P. Campos St. Brgy 4 Dasmariñas City, Cavite	
8.	City Engineer		Dasmariñas City Hall Don P. Campos St. Brgy 4 Dasmariñas City, Cavite	
9.	President, Senior Citizens Association		Dasmariñas City, Cavite	
10.	SK Chairman		Dasmariñas City, Cavite	
11.	Brgy. Paliparan 1	Kap. Remigio Beberino Sec. Princess Joy Candaba	Paliparan 1 Barangay Hall Nyugan Road Dasmariñas City, Cavite nhoraly21@gmail.com	0917.168.2949 0907.032.1442
12.		First Solid Compound	Dasmariñas City, Cavite	
13.		Dasmarinas Royale Village	Dasmariñas City, Cavite	
14.		Pepsi Sales Office	Dasmariñas City, Cavite	
15.	Brgy. Paliparan 2	Kap. Ernesto Santos Treas. Lisa Hormillosa	Paliparan 2 Barangay Hall Paliparan Road Dasmariñas City, Cavite	046.402.5332 0929.267.3795
16.		Calvary Chapel Church	Dasmariñas City, Cavite	
17.		Mabuhay Homes 2000 Subdivision HOA	Paliparan Road Dasmariñas City, Cavite	046.4819360
18.		Paliparan II Elementary School	Paliparan Road Dasmariñas City, Cavite	
19.		Rosario College of Business Arts & Tourism	Dasmariñas City, Cavite	
20.		Blessed Hope Assembly of God	Dasmariñas City, Cavite	
21.	Brgy. Paliparan 3	Kap. Eleuterio Guimbaolibot Sec. Jeanrose Garabiles	Phase 2, Paliparan 3 Dasmariñas City, Cavite brgy.paliparan3@gmail.com bGarabiles@gmail.com	0929.813.9009 0915.349.9192
22.		Avida Residences HOA	Molino-Paliparan Road Dasmariñas City, Cavite	02.848.5200
23.		Pintong Gubat Elementary School	Paliparan Road Dasmariñas City, Cavite	
24.		St. Joseph Catholic Church	Molino-Paliparan Road Dasmariñas City, Cavite	
25.		Ultra Mega Supermarket	Dasmariñas City, Cavite	

No.	Office	Name of Contact Person	Address / Email	Contact No.
26.		Prosper Complex	Dasmariñas City, Cavite	
27.		Tierra Bonita Subdivision HOA	Dasmariñas City, Cavite	
28.	Brgy. Salawag	Kap. Victor O. Topacio Sec. Josefina V. Acosta	Molino-Paliparan Road Dasmariñas City, Cavite	0921.573.7890 0945.465.0988
29.		Viva Homes Subdivision HOA	Salawag, Dasmariñas City, Cavite	
30.		Armstrong Village HOA	Salawag, Dasmariñas City, Cavite	
31.	PCCI – Cavite	Ms. Teresita M. Leabres	2/F Imus Building Imus, Cavite	046.896.4549

APPENDIX 9. PUBLIC SCOPING REPORT.

Introduction

Preparations for the Public Scoping for the LRT Line-6A and Line-6B+C Project started with an information, education and communication (IEC) campaign that was conducted from 24 October 2018 to 04 December 2018 in the five host cities (Parañaque, Las Piñas, Muntinlupa, Dasmariñas and Bacoor) and 35 host barangays (see **Table 1**). The IEC team consisted of personnel of Prime Asset Ventures, Inc. (PAVI) and Seastems, Inc., the environmental consultant for the application for Environmental Compliance Certification (ECC) of the LRT Line-6A and Line-6B+C project.

The objectives of the IEC are to:

6. Inform the host city and barangay local government units (LGUs) and other identified stakeholders about the LRT Line-6A and Line-6B+C project;
7. Obtain preliminary perception/social acceptability data from selected stakeholder groups through key informant interviews and/or focus group discussions;
8. Validate the initial list of stakeholders who will participate in the city level public scoping meetings;
9. Determine the initial schedule of the city-level public scoping meetings and brief key host barangay officials on how they and their constituents can meaningfully participate in the project scoping activities; and
10. Collect secondary information relevant to the environmental study.

Table 1. List of Impact Barangays

Barangays	City		Barangays	City
19. Bayanan	Bacoor		19. BF International	Las Piñas
20. Ligas 2	Bacoor		36. Manuyo Dos	Las Piñas
21. Ligas 3	Bacoor		37. Pamplona Tres	Las Piñas
22. San Nicolas 1	Bacoor		38. Pulang Lupa Dos	Las Piñas
23. San Nicolas 2	Bacoor		39. Talon Uno	Las Piñas
24. San Nicolas 3	Bacoor		40. Talon Dos	Las Piñas
25. Molino 1	Bacoor		41. Talon Singko	Las Piñas
26. Molino 2	Bacoor		42. Ayala-Alabang	Muntinlupa
27. Molino 3	Bacoor		43. Alabang	Muntinlupa
28. Molino 4	Bacoor		44. Cupang	Muntinlupa
29. Molino 6	Bacoor		45. Sucat	Muntinlupa
30. Niog 3	Bacoor		46. BF Homes	Parañaque
31. Talaba 4	Bacoor		47. La Huerta	Parañaque
32. Paliparan 1	Dasmariñas		48. San Antonio	Parañaque
33. Paliparan 2	Dasmariñas		49. San Dionisio	Parañaque
34. Paliparan 3	Dasmariñas		50. San Isidro	Parañaque
35. Salawag	Dasmariñas		51. Sto. Niño	Parañaque
36. Almanza Uno	Las Piñas			

The stakeholder groups that may be potentially affected by the LRT Line-6A and Line-6B+C Project are:

- Host LGUs and related local government agencies in areas to be traversed by project alignment, which include three cities of Metro Manila and two cities of Cavite Province and a total of 35 host barangays;
- Government agencies with related mandate to the project, e.g., Department of Transportation (DOTr) and Metro Manila Development Authority (MMDA);
- Non-government organizations (NGOs) and people's organizations (POs) such as transport groups, business organizations, etc.;
- Affected property owners, business establishments and homeowners' associations; and
- Local institutions such as schools, hospitals, churches, etc.

During the IEC proper, officials and representatives of host cities and host barangays and concerned LGU department heads were provided copies of the project description and were presented with A3-sized map of the project alignment. The consultant discussed the different alignments of LRT Line-6A and Line-6B+C and showed the LGU officials the project segments that will pass through their respective jurisdictions. The LGU officials were then asked to identify potential project stakeholders who may be affected during the pre-construction, construction and operation phases of the elevated railway project. This helped the consultants finalize the list of project stakeholders.

A total of 231 stakeholders from the five impact cities was identified during the IEC and they were invited to attend the city-level scoping meetings. The distribution of the stakeholders and the dates of scoping activities are tabulated below while the receiving copy of scoping invitation letters distributed to project stakeholders from 07 to 14 February 2019 is presented in **Annex 1**.

Table 2. Schedule and Number of Participants in LRT-6 Scoping Sessions

City	Date and Time of Scoping Activity	Scoping Venue	No. of Invited Participants	No. of Actual Scoping Participants
Parañaque	9AM, 18 Feb. 2019	Paranaque City Hall	47	46
Bacoor	9AM, 19 Feb 2019	Bacoor City Hall	66	53
Dasmariñas	1PM, 19 Feb. 2019	Island Park Clubhouse	31	23
Las Piñas	9AM, 20 Feb 2019	Villar SIPAG Hall	55	66
Muntinlupa	1PM, 20 Feb. 2019	Max's Restaurant	32	39
		Total	231	227

Highlights of the Public Scoping Meetings

The scoping sessions in the five impact cities of the LRT-6A and LRT-6B+C Project were conducted from 18 to 20 February 2019. A total of 227 stakeholders attended the five scoping sessions, with the highest number of participants in Las Piñas City followed by Bacoor City and Parañaque City. Scoping participants included representatives from: (1) the host LGUs, particularly the City Planning and Development Office, City Engineering Office, City ENRO and City Traffic Management Departments; (2) host barangays; (3) homeowners association along the project alignment; (4) business sector; and (5) transportation sector. City officials including a Vice Mayor and city councilors attended some of the scoping sessions.

Common issues raised in the scoping sessions centered mostly on the project alignment and exact location of LRT stations, construction schedule/project timeline, conflict with other infrastructure projects, road widening to accommodate project and other infrastructure projects, traffic impacts, noise and dust generation, and the project's impacts to residents in terms of access to subdivisions, schools or business establishments. The submission of a Traffic Impact Study and a comprehensive Traffic Management Plan was mentioned in most of the impact areas. A bigger consultation was also recommended to impart project information to a wider audience.

The project stakeholders noted that most roads along the project alignment are narrow and often experience heavy traffic due to the high volume of vehicles using these roads. Road widening was recommended in most cities to accommodate the LRT 6 as well as other planned infrastructure projects. Conflict with other infrastructure projects was raised in Bacoor, Las Piñas and Muntinlupa and the stakeholders suggested that the proponent should coordinate with concerned government agencies and private companies implementing the planned infrastructure projects.

A summary of the issues and concerns raised in the scoping sessions is presented in **Table 3** while a more detailed discussion on the highlights of the scoping session in each host city is presented in succeeding sections.

Table 3. Summary of Issues and Concerns Raised during the City Public Scoping Meetings for LRT-6

Issues and Concerns	Parañaque	Bacoor	Dasmariñas	Las Piñas	Muntinlupa
Project Description					
Provision of technical documents/exact project alignment so stakeholders can determine project impacts to their areas	✓	✓		✓	✓
Consideration of climate change in project design	✓				
Expected start of project construction and length of construction period; simultaneous construction?	✓	✓	✓	✓	✓
Proper waste management during construction	✓			✓	
Interconnection of LRT-6 with other railway projects	✓		✓		
Acquisition of right of way in private properties	✓				
Timing of project implementation should consider other infrastructure projects in the area	✓			✓	✓
Aesthetic aspects of project	✓				
Conflict with other planned infrastructure projects and coordination with concerned agencies		✓		✓	✓
Roads along project alignment are narrow; road widening should be done to accommodate this project as well as other infrastructure projects		✓	✓	✓	✓
Compatibility of project with Comprehensive Land Use Plan		✓			✓
Presence of station near Bacoor City Hall and accessibility of stations to LRT users		✓			
Provision of public transportation terminal in selected or all LRT stations		✓		✓	
Project alignment on major roads and private properties		✓	✓		
Construction of project on the shoreline rather than busy roads			✓		
Observation of proper road setback in anticipation of the project and other road infrastructure projects			✓		
Underground railway instead of overhead railway	✓				✓
Land					
Seismic analysis to determine location of active faults					✓
Water					
Liquid waste management during construction	✓				
Disallow squatting on waterways traversed by the project to avoid flooding and drainage concerns	✓				
Air					
Project impacts on noise, vibration, air quality	✓	✓		✓	✓
People					
Hampered access of residents and business establishments during project construction and operation	✓			✓	
Compensation of damage to public and private roads and public infrastructures	✓				
Livelihood displacement	✓			✓	
Mass transportation as solution to traffic problems but affected stakeholders will have to bear with the inconvenience during construction	✓				
Conduct survey to identify major traffic issues that should be addressed during project construction	✓				
Submission of Traffic Impact Study and Traffic Management Plan to LGU	✓			✓	✓
Roads along project alignment are very busy and used by several residents as well as schools and business establishments	✓	✓	✓	✓	✓
Regular information dissemination and consultation regarding project timelines and schedules				✓	✓
Others					

Issues and Concerns	Parañaque	Bacoor	Dasmariñas	Las Piñas	Muntinlupa
Relocation of informal settlers in existing roads that can be used as alternate access of residents during construction phase	✓				
Construction of bridge over Laguna Lake to connect southern and northern parts of Metro Manila bypassing EDSA, C-5 and other busy roads	✓				
Technical impact of project such as on drainage, sewer lines, vibration, noise, sound, magnetic intervention, etc.					
Conduct IEC for each impact barangay to let everyone know about the project		✓			
Creation and operation of MMT			✓	✓	
Non-compensation of private property owners whose properties were affected by road construction in Paliparan 1, 2 and 3			✓		
Discussion of issues raised during Public Scoping in Technical Scoping			✓		
Project impact on private business development plans					✓
Information sharing on LGU social media platform					✓

Parañaque City

The Public Scoping in Parañaque City was held on 18 February 2019 at the Mayor's Hall of the Parañaque City Hall. Registration started at 0800H while the scoping meeting commenced at 0930H. A total of 47 scoping participants included: (1) LGU representatives from the City Planning Office, City Engineering Office, City ENRO and Traffic Management Office; (2) representatives from the six host barangays (BF Homes, La Huerta, San Antonio, San Dionisio, San Isidro, Sto. Niño); (3) representatives from homeowners' associations along the project alignment; (4) representatives from educational and medical institutions; and (5) representatives from the business sector. The DENR was represented by Mr. Jhonel Siarez of EMB NCR.

The scoping session started with an invocation led by Mr. Alvin Nacu followed by the singing of the national anthem. Welcome remarks were given by Mr. Nacu, head of the EIA consulting team. This was followed by the introduction of scoping participants, discussion of the scoping program and objectives of the public scoping. Ms. Ma. Theresa Agravante presented the Philippine EIA system including the steps in the EIA process. The project presentation was given by Ms. Armie Jean Perez.

The open forum followed the project presentation. Issues and concerns raised during the open forum in Parañaque City are tabulated in **Table 4** while the scoping documentation is shown in **Annex 2**.

Table 4. List of Issues and Concerns Raised during the Parañaque City Public Scoping

EIA Module	Issues/Suggestions	Raised by	Proponent's Response
Project Description	Will you provide technical documents so stakeholders can study?	Engr. Alfredo Bugayong San Antonio BLGU	None yet. Project description was provided to barangay officials during IEC.
	Did project design consider climate change? Climate change as well as disaster risk reduction is a global concern that need to be addressed	Mr. Vic Macob City TMO	EMB requires proponents to include discussion on climate change concerns in relation to project development and implementation.
	Expected start of construction, how long it will take, inconvenience to Paranaque residents during construction?	Mr. Francisco Jamias Valley 1 HOA	Project construction will take three years to complete but will only start once all permits are secured. Project is still for NEDA approval and ECC is required for NEDA evaluation.

EIA Module	Issues/Suggestions	Raised by	Proponent's Response
	City LGU has a proposal for a monorail. This project is an unsolicited proposal, so stakeholders should raise issues and concerns to be considered in project design.	Mr. Francis Tolentino Fourth Estate HOA	
	City LGU will require traffic management plan for construction. Contractors of several ongoing projects in the city leave construction wastes behind and city LGU is left to manage these wastes. City LGU would like contractors to manage these wastes and will make main contractor (like PAVI) liable for management of construction wastes.	Engr. Ma. Teresa Quiogue City ENRO	Environmental management plan will include solid waste (including construction waste) management during construction. Contracts between contractors and subcontractors will be included so that liability for waste management can be identified later on.
	Are the projects interconnected? Where will the project end along Dr. A. Santos Avenue?		Yes. LRT-6C will end at Lake Front along South Luzon Expressway.
	How will project acquire ROW in private properties?	Mr. Vic Macob City TMO	Land acquisition for infrastructure projects will depend on market price. Proponent will comply with Philippine laws attendant to land acquisition.
Land			
Water	Aside from solid wastes, study should also address liquid waste management, which is normally discharged to canals and waterways.	Mr. Alvaro Bergabe Loyola Chapel	This will be included in the study.
	Squatting on waterways should not be allowed in order not to aggravate drainage and flooding concerns.	Mr. Francis Tolentino Fourth Estate HOA	This will be included in the study.
Air			
People	Fourth Estate only has one egress and ingress along Sucat Road/Dr. A. Santos Avenue. Construction of LRT-6 will impact residents of Fourth Estate.	Nanette Regala Fourth Estate HOA	HOA can help identify alternative access roads that residents can use during project construction.
	Compensation for damage to subdivision roads and infrastructure during project construction	Mr. Francis Tolentino Fourth Estate HOA	Prepare a position paper and submit to barangay and city LGUs; Consultant and LGU will help identify legal remedies for affected subdivisions and this can be included as part of environmental management plan or as ECC condition.
	Timing of implementation should be considered in tandem with existing projects. Consider livelihood displacement and aesthetic aspects. Subway can be more acceptable instead of elevated structure.	Engr. Bong Rivera CPDO	LRT 2 along Aurora Boulevard already considered experience in LRT 1 along Avenida by increasing elevation to minimize impacts to existing structures and establishments. Government is proactive in projects like this and improve based on experience from previous projects.

EIA Module	Issues/Suggestions	Raised by	Proponent's Response
Others	Who will relocate informal settlers who have occupied existing roads that can be used as alternate routes of subdivision residents?	Nanette Regala Fourth Estate HOA	This is city LGU concern. Project will address this if this will affect ROW for project construction.
	Maybe the project can consider bridge connecting both sides of Laguna Lake to avoid traffic congestion on major roads (EDSA, etc.) connecting the northern and southern parts of Metro Manila.	Ms. Rosemarie Laman Fourth Estate HOA	This suggestion is noted and will be discussed in the report.
	Mass transportation is the solution to our traffic problems but affected stakeholders will have to bear with the inconvenience during construction.	Mr. Francisco Jamias Valley 1 HOA	Big projects nowadays prepare comprehensive traffic management plans to minimize inconvenience to affected stakeholders.
	Project should conduct a survey for identification of major traffic issues that should be addressed during project construction.	Mr. Francis Tolentino Fourth Estate HOA	This is noted.

Representative photographs taken during the scoping in Parañaque City are presented in **Plate 1**.

Invocation led by Mr. Alvin Nacu

Presentation on EIA system by Ms. Tessa Agravante

City Planning Officer Engr. Bong Rivera

Project presentation by Ms. Armie Perez

Mr. Vic Macob of the Traffic Management Office

Mr. Francisco Jamias of San Antonio Valley 1 HOA

Plate1. Representative photographs during the scoping in Parañaque City.

Bacoor City

The Public Scoping in Bacoor City was held on 19 February 2019 at the Revilla Hall of the Bacoor City Hall. Registration started at 0800H while the public scoping commenced at 0915H. A total of 53 scoping participants included: (1) LGU representatives from the Mayor's Office, Sangguniang Panlungsod, City Planning Office, City Engineering Office, Barangay Affairs Office, Traffic Management Department; (2) representatives from nine out of thirteen host Barangays (Bayanan, Ligas 2, Ligas 3, Molino 2, Molino 3, Molino 6, Niog 3, San Nicolas 1, Talaba 4); (3) representatives from educational and medical institutions; (4) representatives from homeowners' associations along the project alignment; (5) representatives from the business sector; and (6) representatives from transport groups. The DENR was represented by Mr. Jesus Ramos of EMB Region IV-A.

The scoping session started with an invocation led by Mr. Alvin Nacu followed by the singing of the national anthem. Welcome remarks were given by Mr. Nacu, head of the EIA consulting team. This was followed by the introduction of scoping participants, discussion of the scoping program and objectives of the public scoping. Ms. Ma. Theresa Agravante presented the Philippine EIA system including the steps in the EIA process. The project presentation was given by Ms. Armie Jean Perez.

The open forum followed the project presentation. Issues and concerns raised during the open forum in Bacoor City are tabulated in **Table 5** while the scoping documentation is presented in **Annex 3**.

Table 5. List of Issues and Concerns Raised during the Bacoor City Public Scoping

EIA Module	Issues/Suggestions	Raised by	Proponent's Response
Project Description	We noticed a curve from Molino Boulevard to privately controlled properties. What areas will be affected?	Atty. Jessie Salvador City Engineering Office	From Niog 3, alignment will turn towards San Nicolas 2 and Molino 6 on privately controlled properties.
	Possible conflict with ongoing DPWH flyover project along Bacoor-Dasmarinas Road from Springville to SM Bacoor	Atty. Jessie Salvador City Engineering Office	This is noted and will be considered in project design.
	Will project affect Marcos Alvarez Avenue?		Project alignment in Las Pinas will pass through sections of Marcos Alvarez Avenue.
	Several roads passing through subdivisions in Molino 3 are narrow.		This has been noted during ocular visit of project alignment.
	Molino Road is a very busy road used by several residents as well as schools	Kag. Sabater Barangay Molino 3	This is noted. Comprehensive traffic management plan will address this concern.

EIA Module	Issues/Suggestions	Raised by	Proponent's Response
	and other establishments in the area. Traffic will worsen during construction.		
	Widening on Molino-Paliparan Road, about additional two lanes on both sides in preparation for DPWH flyover project.		This is noted and will be considered in project design.
	Exact location of project alignment so we will know impact areas in our barangays.	JR Dominguez Molino 1	In Molino 1, boundary of Molino 1 will be affected (Orientville area). Molino Road alignment will only pass through southern side of barangay.
	Bacoor is currently updating its CLUP. We would like to know when project will be implemented so we will know which areas will be affected and therefore should not be allowed for development.	Engr. Jess Francisco CPDO	Project is unsolicited proposal and will still need NEDA approval. The project also has to secure several permits from several government agencies. It may take about 3-5 years for permitting but this is not definite and dependent on government approvals.
	Will project pass through Molino-Paliparan Road from Molino to Salawag?	Ms. Issa Statefields School	Yes
	How long will construction take?	Mr. Jose Guinto Barangay Ligas 2	Two years for preparation and about three years for construction.
	Is there a station near Bacoor City Hall? There does not seem to be a station near the government center in the map.	Atty. Jessie Salvador City Engineering Office	There is a proposed City Hall station for LRT 6-A, but exact location has not been determined at this time.
	Stations should be accessible to people of Bacoor and should be considered in finalizing the location of LRT-6 stations. It is good that people are being consulted at this time so they can give their inputs that can be considered in the project design. More discussions with project stakeholders in the future.	Arch. Neil Tavu Bacoor City Consultant	More stakeholders are encouraged to attend in future consultations such as the public hearing. More consultations can also be conducted after ECC issuance and NEDA approval.
	Provision of public transportation terminal on selected or all LRT 6 stations.	Arch. Neil Tavu Bacoor City Consultant	This is noted and will be considered.
Land			
Water			
Air			
People			
Others	Technical impact of project such as on drainage and sewer lines, vibration, noise, sound, magnetic intervention, etc. These will impact results of MRI and other medical tests.	Engr. Jaime Dilidili St. Dominic Medical Center	This will be considered in the study. Several hospitals are also located along EDSA where MRT-3 is located so we hope that this
	Bacoor Boulevard instead of Molino Boulevard	BHOACI	This is noted.
	IEC for each impact barangay to let everyone know about the project. Post maps showing impact areas per barangay. Baseline data for all environmental parameters should be part of study. Creation of MMT and submission of quarterly SMR and semi-annual CMVR.	Mr. Jess Ramos EMB 4A	This is noted.

Representative photographs taken during the scoping in Bacoor City are presented in **Plate 2**.

Introduction of scoping objectives by Ms. Agravante

Scoping participants in Bacoor

Atty. Jessie Salvador of City Engineering Office

Kagawad Edward Sabater of Brgy. Molino 3

Mr. Jess Ramos of EMB Region 4A

Arch. Neil Tavu, consultant of Bacoor City LGU

Plate 2. Representative photographs during the scoping in Bacoor City.

Dasmariñas City

The Public Scoping in Dasmariñas City was held on 19 February 2019 at the Island Park Clubhouse in Barangay Paliparan III. Registration started at 1300H while the public scoping commenced at 1345H. A total of 23 scoping participants included: (1) LGU representatives such as the City Vice Mayor, members of the City Council, and a representative from the Traffic Management Bureau; (2) representatives from three out of four host barangays (Paliparan 1, Paliparan 2 and Salawag); (3) representatives from educational institutions; and (4) representatives from the business sector. The DENR was represented by Mr. Jesus Ramos of EMB Region IV-A.

The scoping session started with an invocation led by Mr. Alvin Nacu followed by the singing of the national anthem. Welcome remarks were given by Mr. Nacu, head of the EIA consulting team. This was followed by the introduction of scoping participants, discussion of the scoping program and objectives of the public scoping. Ms. Ma. Theresa Agravante presented the Philippine EIA system including the steps in the EIA process. The project presentation was given by Ms. Armie Jean Perez.

The open forum followed the project presentation. Issues and concerns raised during the open forum in Dasmariñas City are tabulated in **Table 6** while the scoping documentation is presented in **Annex 4**.

Table 6. List of Issues and Concerns Raised during the Dasmariñas City Public Scoping

EIA Module	Issues/Suggestions	Raised by	Proponent's Response
Project Description	Is this project interconnected with other MRT/LRT lines? There should be interconnection and seamless integration between these public infrastructures. Is the project independent of the LRT-1 extension? How soon can the project be implemented?	VM Rex Mangubat	The project is designed in such a way that the starting point of LRT-6A at Niog station is at the end point of LRT-1 extension. Yes. Hopefully LRT-1 extension has been completed by the time LRT-6 is ready for implementation. It will take about 3-5 years for permitting and implementation.
	Why did the project alignment veer away from Molino Blvd? Alignment should follow Molino Road alignment.	SPM Dela Cuesta	This is part of project design and will be explained by the proponent in the document.
	Maybe the presented alignment is less problematic and will entail minimal ROW acquisition rather than following the straight road alignment.	Engr. Momar Santos	This is noted.
	Maybe, one way to address possible ROW issues to build the structure on the shoreline and connect it to PITX perhaps.	VM Rex Mangubat	This suggestion is noted.
	How much ROW is required at Molino Road? Construction of piers/columns on this road will require road widening to accommodate both the proposed infrastructure and vehicles using this road.	Ms. Mina India Rosario College	This is noted. Coordination with the LGU, DPWH and other concerned stakeholders will be done to discuss these issues.
	Is there a single project proponent for all alignments presented earlier? Does this mean that people using this infrastructure will not have a problem transferring from one line to the other lines.	Kag. Miraflores Paliparan II	Yes, PAVI is the proponent for LRT-6A and LRT-6B+C.
Land			
Water			
Air			
People			
Others	Most roads in Paliparan 1, 2 and 3 were constructed on privately owned properties and owners have not been compensated by the government.	Kag. Tagle Paliparan I	This issue will be referred to the concerned government agency with the assistance of DENR.
	Issues raised during the project scoping will be discussed during the technical scoping.	Mr. Jess Ramos DENR 4A	
	Maybe establishments located along the road should observe the proper setback so that ROW will not be a problem during project implementation.	Engr. Momar Santos	This is noted.

Representative photographs taken during the scoping in Dasmariñas City are presented in **Plate 3**.

Introduction of scoping objectives by Ms. Agravante

Scoping participants in Dasmariñas City

City officials and barangay officials of Paliparan 2

Vice Mayor Rex Mangubat

Engr. Momar Santos of the business sector

Ms. Irmina Delos Santos of Rosario College

Plate 3. Representative photographs during the scoping in Dasmariñas City.

Las Piñas City

The Public Scoping in Las Piñas City was held on 20 February 2019 at the Villar SIPAG Hall along C-5 Extension Road in Barangay Pulanglupa Uno. Registration started at 0800H while the public scoping commenced at 0915H. A total of 66 scoping participants included: (1) LGU representatives from the City Administrator, City Planning Office, members of the City Council, City Engineering Office and Traffic Management Bureau; (2) representatives from seven out of eight host barangays (Almanza Uno, BF/CAA, BF International, Manuyo Dos, Pamplona 3, Pulanglupa 2, Talon Uno,Talon Dos); (3) representatives from educational and medical institutions; (4) representatives from the business sector; and (5) representatives from transport groups. The DENR was represented by Mr. Jhonel Siarez of EMB NCR.

The scoping session started with an invocation led by Mr. Alvin Nacu followed by the singing of the national anthem. Welcome remarks were given by Mr. Nacu, head of the EIA consulting team. This was followed by the introduction of scoping participants, discussion of the scoping program and objectives of the public scoping. Ms. Ma. Theresa Agravante presented the Philippine EIA system including the steps in the EIA process. The project presentation was given by Ms. Armie Jean Perez.

The open forum followed the project presentation. Issues and concerns raised during the open forum in Las Piñas City are tabulated in **Table 7** while the scoping documentation is presented in **Annex 5**.

Table 7. List of Issues and Concerns Raised during the Las Piñas City Public Scoping

EIA Module	Issues/Suggestions	Raised by	Proponent's Response
Project Description	Will all lines be constructed simultaneously? Will the Las Pinas line constructed first since it is closest to Metro Manila?	Coun. Renan Riguero Sangguniang Panlungsod	Project timeline is to secure permits within one to two years and construction will take about 3-4 years. Proponent will touch base with LGUs and concerned stakeholders prior to project implementation particularly on traffic management.
	Alabang Zapote Road is like EDSA where traffic is heavy all day. This project is welcome in terms of provision of mass transportation. Did the proponent coordinate with DPWH regarding flyover projects in Alabang-Zapote Road at the corner with CAA and Marcos Alvarez? Flyover height is 4.5m so LRT-6 should consider this. Sewer line project is also planned. These projects of other agencies should be considered. Road widening may be necessary to occupy all these proposed infrastructure projects in the city.	Coun. Danny Hernandez Sangguniang Panlungsod Public Works Committee	The same issues have been raised in other LGUs traversed by the project. These concerns will be referred to the engineering group for consideration in the project design. The proponent will also discuss these projects with the concerned government agencies and private groups. DENR will also invite resource persons from various government departments during the EIA review so that issues and concerns will be addressed prior to project commencement.
	Project planning, detailed engineering plans and bidding for project construction will take time to complete. How frequent is the construction meeting and who will attend this meeting?	Kgd Romy Bautista Pamplona Tres	Detailed project details can be presented during public hearing. Project details before and during project implementation can be disseminated by the project's community relations team.
	Is this a national government project?	Kap. Ruben Sanchez Talon Dos	PAVI submitted an unsolicited proposal to DOTr, which forwarded the proposal to NEDA for approval. The project is a PPP between PAVI and DOTr.
Land			
Water			
Air	The project will traverse a highly residential area with some commercial areas. The project will have impacts that will affect all residents. These include traffic, noise, dust generation and waste management. The EIA study will help us explain better to HOA residents the project impacts to our residents.	Citadella HOA	The EIA will have a section on Environmental Management Plan which will enumerate mitigating measures to address identified project impacts. During the technical scoping, the EIA review committee members will require technical studies including noise, vibration, etc.

EIA Module	Issues/Suggestions	Raised by	Proponent's Response
			The EIA becomes a public document once it is submitted to DENR. Stakeholders can ask a copy from DENR. Necessary sections can be provided to interested stakeholders. Stakeholders are encouraged to attend the public hearing to find out about the results of the EIA study.
People	Will the project affect establishments and residents along Marcos Alvarez?	Golden Acres School	This will be addressed in the EIA study.
	CAA Road is narrow. How long is the project construction? This will impact resident TODA members and may eliminate or phase out their route.	Kgd. Jimmy Aborque Brgy. CAA	This is a major project concern and will be assessed during the EIA study.
	What will happen during construction? This can impact establishments along the project alignment, particularly our hospital. Will the proponent regularly inform us about the project schedule?	Las Pinas Medical Center	Proponent will form a community relations team for each project area. This group will be responsible for finding out about stakeholder issues and concerns and dissemination of project information to concerned stakeholders. DENR will also require the proponent to monitor dust levels and other critical environmental parameters during construction to ensure that levels are within DENR standards.
	What will happen to our road access along CAA Road and BF when the project is implemented? When can we know the project milestones so we can also prepare? Alabang-Zapote Line will also affect us and will leave us no access road.	Ms. Carol La Serna Southville International School and Colleges	The project will have a transport and traffic study and prepare a traffic management plan during project construction. Timeline cannot be firmed up at this time since we are still in the early stages of the project. It will be recommended for the proponent to regularly inform project stakeholders about project timeline.
	This project can have impact on our deliveries and business operation. We request that there will be an efficient traffic management plan during the construction phase. The project may also consider our products during project construction and maintenance. We also request the proponent to be more responsible in complying with ECC conditions and overall project management to minimize inconvenience to road users and establishments along the project alignment.	Darwin de Lima Sika Philippines	The points are well taken. Participation of the city and barangay LGUs and other stakeholders in the MMT is also encouraged so that project monitoring can be more comprehensive.
	Many of the members of our TODA may lose livelihood during project implementation. Why did the project alignment pass through CAA Road instead of other roads in Las Pinas?	Elmer CEBM TODA	Possible loss of livelihood is noted and will be included in the assessment of project impacts. Project alignment has undergone a feasibility study technical concerns

EIA Module	Issues/Suggestions	Raised by	Proponent's Response
			and practicality have been analyzed. Suggestions will be noted and can be considered to make the project design more responsive to needs and concerns of project stakeholders.
Others	Who will be involved in the monitoring during project construction? How will concerns and complaints about the project be communicated to the proponent and concerned government agencies?	Engr. Leonida Lagrisola CPDO	Multi-partite monitoring team (MMT) will be formed prior to start of project construction. MMT will be composed of LGU representatives (city and barangay), project proponent, POs/NGOs, private sector, concerned government agencies and other project stakeholders. Proponent will also be required to submit quarterly SMR and semi-annual CMR. MMT will also evaluate project compliance to environmental management and monitoring plan (EMMoP) and will prepare CMVR. MMT meets quarterly. The project is still at the scoping stage. DENR will invite technical reviewers from various sectors to check that the EIS has addressed possible project impacts and all recommendations for environmental management will be implemented by the proponent. DENR and project stakeholders should continuously monitor project compliance to EMMoP.

Representative photographs taken during the scoping in Las Piñas City are presented in **Plate 4**.

Introduction of scoping objectives by Ms. Agravante

Scoping participants in Las Piñas City

City Adm. Rey Balagulan and Councilor Danny Hernandez

Councilor Renan Riguera

Mr. Jhonel Siarez of EMB NCR

Engr. Leonida Lagrisola of the City Planning Office

Plate 4. Representative photographs during the scoping in Las Piñas City.

Muntinlupa City

The Public Scoping in Muntinlupa City was held on 20 February 2019 at Max's Restaurant in Westgate Center Alabang. Registration started at 1300H while the public scoping commenced at 1330H. A total of 39 scoping participants included: (1) LGU representatives from the City Council, City Planning Office, City Engineering Office, Traffic Management Department, and Public Information Office; (2) representatives from one out of four host barangays (Alabang); (3) representatives from educational and medical institutions; and (4) representatives from the business sector. Representatives from the Parañaque City and Muntinlupa City Police Departments also joined the scoping activity. The DENR was represented by Mr. Jhonel Siarez of EMB NCR.

The scoping session started with an invocation led by Mr. Alvin Nacu followed by the singing of the national anthem. Welcome remarks were given by Mr. Nacu, head of the EIA consulting team. This was followed by the introduction of scoping participants, discussion of the scoping program and objectives of the public scoping. Ms. Ma. Theresa Agravante presented the Philippine EIA system including the steps in the EIA process. The project presentation was given by Ms. Armie Jean Perez.

The open forum followed the project presentation. Issues and concerns raised during the open forum in Muntinlupa City are tabulated in **Table 8** while the scoping documentation is shown in **Annex 6**.

Table 8. List of Issues and Concerns Raised during the Muntinlupa City Public Scoping

EIA Module	Issues/Suggestions	Raised by	Proponent's Response
Project Description	How long will construction take and how do you plan to address traffic management?	Ms. Michelle Ragpa Doña Rosario Heights, Sucat	According to the timeline, construction will take about three years. Since the project has four alignments, construction will be done in phases. To address the concern on traffic, the proponent will work together with the LGUs to devise a traffic management plan for sections of the alignment that will be affected during project construction. Comprehensive traffic study will be done to determine impacts to various project stakeholders including residents, establishments, institutions, transport groups, etc.
	Independent traffic impact assessment (TIA) should be done to determine project impact to traffic flow before, during and after project construction.	Mr. Don Nolasco Muntinlupa TMB	The need for a TIA will be determined during the technical scoping with the DENR EIA review committee.
	The scoping seems to be lacking since information provided to the invited stakeholders is not sufficient. The best option or model should be implemented. The project will have impacts on traffic, existing vegetation, etc.	Coun. Marissa Rongavilla Muntinlupa LGU	Project information were provided to the impact LGUs (city and barangay) in October and November 2018. The scoping is part of the EIA process where the proponent will present the project to identified project stakeholders. Subsequent consultations will be done after completion of the EIA study where information on project impacts to land, air, water, and people will be presented.
	Scoping will be more fruitful if more information is provided and more people are involved.	Coun. Marissa Rongavilla Muntinlupa LGU	This is noted.
	Bigger consultation should be done after technical study so more people will be aware about the project.	Ms. Tess Navarro Muntinlupa PIO	This is noted.
	More project details should be provided so people can give better feedback about the project.	Ms. Michelle Ragpa Doña Rosario Heights, Sucat	This is noted.
	Limited information has been provided so we cannot give comments in terms of environmental impact. The project will have huge impacts on air, traffic, and other environmental concerns. More project details should be presented in succeeding consultations. The location of the terminal will have a huge impact to Brgy. Alabang.	Mr. Dave Martinez Brgy. Alabang Engg. Dept.	This is noted.
	We need to know location of stations and piers in order for us to determine the project impacts.	Coun. Marissa Rongavilla Muntinlupa LGU	This is noted.

EIA Module	Issues/Suggestions	Raised by	Proponent's Response
	Skyway extension or expansion should be considered by the project. Is there a plan for road widening in Alabang-Zapote Road to accommodate this project and the existing road traffic (~50,000 vehicles/day)?	Mr. Don Nolasco Muntinlupa TMB	Inter-agency coordination will be done to determine solutions for these concerns.
	A schematic diagram of the project alignment will be a big help for us to determine the project impacts to our barangay.	Mr. Dave Martinez Brgy. Alabang Engg. Dept.	This is noted.
Land	Seismic analysis should be done to determine project location in terms of the existing fault line in Muntinlupa.	Arch. Eugene Ragpa Doña Rosario Heights, Sucat	EIA study will include EGGAR and geotechnical study.
	City has a zoning ordinance which determines which areas are not allowed for development and which areas have future development projects.. LGU also requires project proponents to submit a third party Traffic Impact Assessment.	Mr. Jose Adriano CPDO	This is noted.
Water			
Air	Is there an option for an underground railway instead of an overhead railway system? Lakefront is near our residence so having a station there will generate a lot of noise in our area.	Arch. Eugene Ragpa Doña Rosario Heights, Sucat	The project underwent a feasibility study where several concerns and parameters were considered. The study identified the initial alignment and station locations. An overhead railway is more feasible compared to an underground railway.
People			
Others	The project will impact on FLI's development plan so we would like to know when we can have more project details.	Arch. Louie Lava Filinvest Alabang	Meetings can be scheduled with select stakeholder groups to discuss these issues and concerns.
	Information can be shared on the LGU's social media platform.	Ms. Tess Navarro Muntinlupa PIO	This is noted.

Representative photographs taken during the scoping in Muntinlupa City are presented in **Plate 5**.

Scoping participants in Muntinlupa City

Ms. Michelle Ragpa of Doña Remedios Heights HOA

Mr. Jhonel Siarez of EMB NCR

Mr. Don Nolasco of the Traffic Management Department

Councilor Marissa Rongavilla

Mr. Dave Martinez of Barangay Alabang

Plate 5. Representative photographs during the scoping in Muntinlupa City.

Annex 1. Receiving Copy of Scoping Invitation Letters

LRT LINE-6A AND LINE-6B+C SCOPING INVITATIONS RECEIVING COPY (PARAÑAQUE CITY)

No.	Office	Name of Contact Person	Received by	Date
1.	Mayor's Office	Hon. Edwin L. Olivarez Cathy Bonsol (Secretary)	CATHY BONSOL	2-7-19 7:30AM
2.	Vice Mayor's Office	Hon. Rico T. Golez	ABBIE	2-7-19 7:42AM
3.	Congressman 1st District	Hon. Eric Olivarez		
4.	Cong. 2nd District	Hon. Gustavo Tambunting		
5.	Chairman, SP Committee on Environment			2-4-19 9:45AM
6.	Chairman, SP Committee on Infrastructure			
7.	City Administrator	Mr. Fernando Soriano Cathy Amanio (Secretary)	CATHY BONSOL	2-7-19 7:30AM
8.	City Planning Office	Engr. Jun Rivera	Mabel D. Sahagun	2-7-19 7:35AM
9.	City TMO	Mr. Teodorico Barandino	NILOA AYON	2-7-19 8:00AM
10.	City ENRO	Bernardo N. Amurao	ELAINE LACEDA	2/7/19 8:[illegible]
11.	City Engineering	Engr. Aser S. Mallari		2/7/19
12.	City Information Office	Mr. Mario L. Jimenez		2/7/19 9:04
13.	Police Station	PS/Supt. Rogelio T. Roxas, Jr.	NUP Yolanda Pilar	2/7/19
14.	ABC President	Hon. Chris Aguilar Brgy. Marcelo Green	RODILLO G. RABINA 8:13 A.M.	2/7/19
15.	President, Senior Citizen's Association			2/7/19 8am
16.	SK Chairman	Hon. HANNAH M. FLORENCIA	Joyce Villar	2/7/19
17.	Parañaque Transport Group	Makati Ayala Bicutan Sucat UV Express Operators Drivers Association, (MABSUVEODA) Inc.		
18.	Brgy. BF Homes	Hon. John Paolo N. Marquez Brgy Sec. Excel Nillar	RAMON M. ABENIR JR	2/7/19 4:50pm
19.		Manila Memorial Park and Crematory	[illegible]	[illegible]
20.		Teoville Subdivision HOA	[illegible]	2/7/19 5:[illegible]
21.		SM City BF Parañaque	Warner	2/7/19 5:[illegible]PM
22.		Loyola Memorial Chapels and Crematorium	[illegible]	2/7/19 5:55pm
23.		Goodwill 2 Subdivision	[illegible]	2/12/19

No.	Office	Name of Contact Person	Received by	Date
24.		Mondelez International	Gerly Castanares	2/7/19
25.		St. James College (closed)		
26.	Brgy. La Huerta	Hon. Peter Augustine N. Velasco Brgy. Adm. Orlando G. Tuscano	Anita Bautista	2/7/19 1:05pm
27.	Brgy. San Antonio	Hon. Leopoldo C. Casale Brgy. Sec. Jomar F. Eugenio Brgy. Adm. Celeste Kibanoff Brgy. Asst. Sec. Jellyn Bautista	2/7/19	
28.		San Antonio Valley HOA HASAV-1		2/7/19
29.		Fourth Estate Subdivision HOA AREA 1		2/7/19
30.		Mon El Subdivision HOA	Rachel	2/7/19
31.		Medical Center Paranaque		02/07/19
32.		Unihealth Parañaque Hospital & Medical Center	Shiela Gaor	2/7/19
33.		Uniwide closed		
34.		Ramon Pascual Institute		2/7/19
35.		Elorde Sports Center		
36.		Shopwise Sucat		
37.		San Antonio High School	ANGELBERT T. TAPAS 2/7/19	2/7/19
38.	Brgy. San Dionisio	Hon. Pablo R. Olivarez, MD Brgy. Adm. Erlinda Bernardo Kag. Melencio Santos Engr. Saporna (Brgy Engg Office)	E. Bernardo	2/7/19
39.		San Dionisio Elementary School		2/7/19
40.		Datamex Institute of Computer Technology	GINA C. MANAPAT	2/7/19
41.		SM City Sucat		2/7/19
42.		AMA Computer University		2/7/19
43.		Gatchalian 1 Subdivision HOA		2/7/19
44.		Olivarez College	Ching Actub	2/7/19
45.		Olivarez General Hospital		2/7
46.		Liana's Shopping Mall and Supermarket		2/7/19

No.	Office	Name of Contact Person	Received by	Date
47.		Avida Towers Sucat		07 FEB 2019
48.	Bgy. San Isidro	Hon. Noel P. Japlos Brgy. Adm. Alfred Agor Brgy. SWM Consultant Milou Carlos	CHERRYLU TAN	07 Feb, 2019
49.		Universal College		7 FEB 2019
50.		Fortunata Village Garden City subdivision 1 & 2 HOA	PATTY LOPEZ	2-12-19
51.		Greenheights Village HOA		FEB. 7. 2019
52.		Topland Subdivision		2/14/19
53.		Waltermart Sucat	MA. CRISTINA VALDEZ	2/7/19
54.		SM Hypermart Sucat		2-7-19
55.	Brgy. Sto. Niño	Hon. Johnny C. Co		2-7-19

LRT LINE-6A AND LINE-6B+C SCOPING INVITATIONS RECEIVING COPY (BACOOR CITY)

No.	Office	Name of Contact Person	Received by	Date
1.	Mayor's Office	Hon. Lani M. Revilla	# 020194 Julie Bertumen	2/8/19
2.	Vice Mayor's Office	Hon. Karen S. Evaristo	Jute 07/08/19	07/08/19
3.	Congressman	Hon. Strike B. Revilla		02/8/19
4.	Chairman, SP Committee on Environment		JENIFER LEGASPI	2/8/19
5.	Chairman, SP Committee on Infrastructure	CON. RAMON DE LEON	RAMON	2/8/19 9:45a.m
6.	City Administrator	Mr. Jerome Oliveros Atty. Roy Cheng	Mara Dakuraya	2/8/19
7.	City Planning Office	Engr. Jesus D. Francisco	SYLVIA	2/8/19
8.	Barangay Affairs Office	Mr. Elmer Jimenez	MARITES	2/8/19
9.	Bacoor Traffic Office	Geronimo del Rosario Adel Udarbe	Rica Diamante	2/8/19
10.	City ENRO		Ronald Dino	2/8/19
11.	City Engineering		Cecilia Jimenez Cruz	2/8/19 9:25am
12.	ABC President	Hon. Reynaldo Palabrica	NOEL ALEJANDRINO	2/8/19 9:40am
13.	President of Senior Citizen's Organization		ANTONIO A. [illegible]	02/08/2019 10:37 am
14.	SK Chairman		Edgar Allan Solis	2/8/19 9:45am
15.	Brgy. Ligas 2	Kap. Delfin Pascual Sec. Jose V. Guinto	JOSE GUINTO	2/9/19 4:00 PM
16.		F&E De Castro Village HOA	Mikyla Medina	2/9/19
17.		Coastal Wood Subdivision HOA	Josephine G. Cussi Secretary	2/9/19
18.		Wood Crest Subdivision HOA	TONY NARANI	2/9/19
19.	Brgy. Ligas 3	Kap. Pablo N. Morales Sec. Heidi Mendoza		
20.		Casimiro Westville Homes HOA (Phases 1 to 5)		2/9/19
21.	Brgy. San Nicolas 1	Kap. Sonny Boy Francisco Sec. Allan Allanigue		02-09-19
22.	Brgy. San Nicolas 2	Kap. Edgardo G. Pantoni Brgy ex-o Rodel S. Solis		02-09-20
23.	San Nicolas 3	Camella Homes Lessandra HOA (CON-LEXVE)		02-11-19
24.		Camella Homes Altea HOA		2-9-19

No.	Office	Name of Contact Person	Received by	Date
25.	Brgy. San Nicolas 3	Kap. George G. Gawaran Sec. Priscilla Orig	EXO LINDO SANTOS	02/09/19
26.	Brgy. Molino 1	Kap. Jeo Dominguez Sec. Arlene Ramos	EDGARDO JIMENEZ	02/09/18
27.		Progressive Village HOA	GLEN EUPCE In Behalf	02/09/19
28.		Green Breeze Village HOA		
29.	Brgy. Molino 2	Kap. Michael J. Saquitan Sec. Gracia Baria Asst. Sec. Genesis Ventura	NONATO RICAMARA T.L. TANDO	2/9/19
30.		Mission to the World Philippines Foundation, Inc.	TOIZ P. LEGALES	2/9/19
31.		St. Michael Medical Hospital	JOY MITRA	2/9/19
32.		RFC Molino Mall	JACQUELINE SALVATION	2-9-19
33.	Brgy. Molino 3	Kap. Apolonio I. Advincula, Jr. Brgy Sec Ambrosio Esguerra Kag. Michael Bautista (Sanitation and Environment Committee) Kag. Josie Criste (Social Welfare and Culture Committee)	AMBROSIO D. ESGUERRA Brgy. Secretary	2-9-19
34.		Molino Elementary School	JOEL M. CABIGON	2-9-19
35.		Southeast Asian Medical Center	GERMANO APPLE	2-9-19
36.		University of Perpetual Help	Emily Francisco	2-9-19
37.		St. Thomas More Academy Philippines	for ROSELYN LESLIE	2-9-19 5:40PM
38.		Wood Estate Village II HOA	2/9/19 MARISSA C. SALCEDA	
39.		Statefields School	SG KONCA	2-9-19
40.		Citta Italia HOA		2-09-19
41.		Progressive Village 14 HOA		2/09/19
42.		Lynville Subdivision HOA	RICIA GALLON	2/9/19
43.		Town and Country West Subdivision HOA	RUEL TEMPO	2-14-19
44.		Melrose Park Subdivision HOA	NO RAGASJE	2/9/19
45.		Villa Cristorey Subdivision HOA	GEORGE VIRTUDAZO	2/9/19
46.		Camella Springville Subdivision HOA	SIONE ELIZALDE FEDERATION OF SPRINGVILLE CITY HOMEOWNERS ASSOCIATION, INC	

No.	Office	Name of Contact Person	Received by	Date
47.		Camella Springville TODA Multipurpose & Transport Services Cooperative		02/09/19
48.		Molino-Alabang UV Express Terminal	Kabisig Multi-Purpose + Transport Service Coop.	2-9-19
49.		Molino Homes I Subdivision HOA		02-09-19
50.		Molino-Ayala Makati UV Express Terminal		07-09-19
51.		Molino Homes Tricycle Operators & Drivers Association		2-9-19
52.	Brgy. Molino 4	Kap. Jeffrey P. Campaña Kag. Wilfredo Tating		2-9-19
53.		Vista Mall Daang Hari		2-9-19
54.		Camella Cerritos Heights Daang Hari HOA		2/9/19
55.		Camella Lessandra Heights HOA		2/9/19
56.	Brgy. Molino 6	Kap. Ronaldo Javier Sec Roberto Cruz		2-9-19 at 9:45 am
57.		Soldiers Hills IV Subdivision HOA		2-9-19
58.		Soldiers Hills II Subdivision HOA	CYNTHIA M. SACUMA	2-9-2019
59.	Brgy. Niog 3	Kap. Pastor Sagenes Sec. Annalyn Flores	LEO ALBERT TINOY	02/09/19
60.	Brgy. Bayanan	Kap. Alfie O. Gawaran Sec. Regie Ugalde	REGIE UGALDE	02-09-19
61.		Molino Doctor's Hospital	Vangelyn Ramirez (Molino 2)	2.9.19
62.	Brgy. Talaba IV	Kap. Julieto T. Arcega Sec. Rochelle Reynes	EDELYN D. CLANTO	02/9/19
63.		Talaba Elementary School	ZANDRO N. RODRIGUEZ	2/9/19
64.		St. Dominic College of Asia	Florentino Bigtas Jr.	02/09/19
65.		St. Dominic Medical Center		2-09-19
66.	KASAMA KA (Molino3)	Mr. Narciso Nato (transport group)	ERIC L. MONTALBO	2-09-19

MOSITODA

LRT LINE-6A AND LINE-6B+C SCOPING INVITATIONS RECEIVING COPY (DASMARIÑAS CITY)

No.	Office	Name of Contact Person	Received by	Date
1.	Mayor's Office	Hon. Elpidio F. Barzaga, Jr.	Gliendy Buenso	2/8/19
2.	Vice Mayor's Office	Hon. Raul Rex D. Mangubat	Grifdu Borabin	2-8-19
3.	Chairman, SP Committee on Environment		Mailyn Medina	2/18/19
4.	Chairman, SP Committee on Infrastructure		Mailyn Medina	2/18/19
5.	City Planning Office	Engr. Moises C. Menguito Engr. Jonas C. Dela Cuesta	Lady Denze Camina	2/18/19
6.	Traffic Management Bureau		Michael Azevedo	2/8/19
7.	City ENRO		Meryl R. Olleros	2/8/19
8.	City Engineer		Michael Pavedes	2-8-19
9.	President, Senior Citizens Association	NA	Marelou Dimaculangan	2-8-19
10.	SK Chairman		Angie Escorido	2-8-19
11.	Brgy. Paliparan 1	Kap. Remigio Beberino Sec. Princess Joy Candaba	Princess Candaba	2-08-19
12.		First Solid Compound	Erwin V. Escanilla	2-08-19
13.		Dasmarinas Royale Village	Sg. Dim	2/8/19
14.		Pepsi Sales Office	Thaddeus Malunga	2/8/19
15.	Brgy. Paliparan 2	Kap. Ernesto Santiago Treas. Lisa Hormillosa	Baruelo C. Cantor	2/14/2019
16.		Calvary Chapel Church		
17.		Mabuhay Homes 2000 Subdivision HOA	Benilda A. Mapsat	2/8/19
18.		Paliparan II Elementary School	Rowena Gerardo	2/8/19
19.		Rosario College of Business Arts & Tourism	Janice Baguio	2/8/19
20.		Blessed Hope Assembly of God	Dino Mendoza	2/8/19
21.	Brgy. Paliparan 3	Kap. Eleuterio Guimbaolibot Sec. Jeanrose Garabiles	Jeanrose Garabiles 09158499192	02-08-2019
22.		Avida Residences HOA	Julie Miclat	2-8-19
23.		Pintong Gubat Elementary School	Crispin M. Llanto DRRM Coordinator 09127455 7365	02-08-2019

No.	Office	Name of Contact Person	Received by	Date
24.		St. Joseph Catholic Church		
25.		Ultra Mega Supermarket	Mary Jane Nudque	02/08/19 1:40pm
26.		Prosper Complex	Allen C. Mecor	02/08/19
27.		Tierra Bonita Subdivision HOA	3/4 Richard [illegible]	[illegible] 02/08/19
28.	Brgy. Salawag	Kap. Victor O. Topacio Sec. Josefina V. Acosta	[illegible] A. [illegible]	2-8-19
29.		Viva Homes Subdivision HOA	Alona [illegible]	2/8/2019
30.		Armstrong Village HOA	Myrna Circulado	[illegible] 2-8-19
31.	PCCI – Cavite	Ms. Teresita M. Leabres		

Room 103 Virata Hall, E. Jacinto Street, University of the Philippines, Diliman, Quezon City 1101, Philippines
Telefax: (+632) 920-1706 * Email: info@seastems.com * www.seastems.com

08 Febuary 2019

CITY GOVERNMENT OF MUNTINLUPA
OFFICE OF THE MAYOR
RECEIVED
DATE/TIME FEB 08 2019 11:20
SIGNATURE JOANNE

HON. JAIME R. FRESNEDI
Mayor
Muntinlupa City

Dear MAYOR FRESNEDI:

On behalf of Prime Asset Ventures, Inc., I would like to transmit the invitation letter issued by DENR EMB Central Office for the Public Scoping for the LRT Line-6A and Line-6B+C Project scheduled at 1:30PM on 20 February 2019 at Max's Restaurant in Westgate Center Alabang. The public scoping will be a venue for the project stakeholders to raise their issues and concerns on the proposed project.

The list of identified project stakeholders is also attached to this letter. We would appreciate if the Muntinlupa LGU can assist us in the dissemination of information to the city and barangay LGU officials, city department heads and other project stakeholders.

Thank you.

Sincerely,

ALVIN F NACU
President

LRT LINE-6A AND LINE-6B+C SCOPING INVITATIONS RECEIVING COPY (MUNTINLUPA CITY)

No.	Office	Name of Contact Person	Received by	Date
1.	Mayor's Office	Hon. Jaime R. Fresnedi	JOANNE	FEB 08 2019
2.	Vice Mayor's Office	Hon. Celso C. Dioko	EDWIN EC Mde	FEB 8, 2019
3.	Chairman, SP Committee on Environment	Hon. Marissa C. Rongavilla District 2		Feb. 8, 2019
4.	Chairman, SP Committee on Infrastructure	Hon. Luisito A. Arciaga District 1	GAILE MAGLAHUS	FEB 08 2019
5.	City Administrator	Mr. Engr. Allan A. Cachuela Mr. Roger John Smith (Deputy)		Feb. 8, 2019
6.	City Planning Office	EnP Noel A. Cadorna Jose David E. Adriano	JURETH SAGUN	FEB 08 2019
7.	Muntinlupa Traffic Management Bureau	Mr. Danidon N. Nolasco	DAILY GUARICH	FEB 8 · 2019
8.	City ENRO	Ms. Lorna B. Misa	NOEMI A. CALDERON	FEB 08 2019
9.	City Engineering	Engr. Dynadelle N. Aranda	Andy Dollantay	2-8-2019
10.	Police Station	PS/Supt. GERARDO L UMAYAO		2-12-19 1:35PM
11.	President, Senior Citizens Association			
12.	SK Chairman	COUN. KENICHI D.A. TAKAGI VR.	KRISTEL DANCE	FEB 8, 2019
13.	Transport Group	Metropolis Alabang Pasay Jeepney Operators, Drivers and Dispatcher's Association, Inc. (MALPAJODAI)		
14.	Barangay Alabang	PB Hon. Christine May A. Abas Brgy. Sec. Floyd Joseph Reynante	Gerica Pangilinan	2/8/19
15.		Filinvest Alabang	Rhane Chan	2/14/19
16.		South Station Transport Terminal	BA ETANG, G P	2-8-19
17.		Skyway O&M Corporation	SILVERIO L. SOLOMON JR.	2/12/19
18.	Barangay Ayala Alabang	PB Hon. Ruben P. Baes	JACK DAYUTA	2-12-19
19.		Alabang Town Center	JULIUS P. EZRA	2-12-19
20.		Molito Lifestyle Center	Rex Fortin	2/12/19

No.	Office	Name of Contact Person	Received by	Date
21.		Madrigal Business Park		
22.	Barangay Cupang	PB Hon. Rainier Emmanuelle B. Bulos Brgy. Sec. Mc John Nicolas	ARRIANNE MARTINEZ	02/12/19
23.		Pacific Village	LUMBIS, MARK JOMARO	02/12/19
24.		San Jose Village	OJ Amy San Jose Guardhouse office	02/12/19
25.		Alabang Medical Center	Imee M. Imperial	2/12/19
26.		Rev. Dom Clement Ma. Roque Rector-President San Beda College Alabang	fa: Mina Babad	2/12/19
27.	Barangay Sucat	PB Hon. Rafael T. Sevilla	XIOLIAH A. MEDOWLES	2-12-2018 7:47h
28.		Philippine National Construction Corporation	EFREN A. LABAYO	2-12-19 9:50 AM
29.		Posadas Village HOA	GONZALES EDDIE	2-12-19
30.		Dona Remedios Heights Subdivision HOA	mohammad alhokie	2-12-19
31.		Lake Front Development	SO Benjamin Pergade	2/12-19
32.		Jeepney Operators and Drivers Association		

Annex 2. Documentation of Public Scoping in Parañaque City

Project Name	LRT Line-6A and Line-6B+C Project	Project Location	Parañaque City, Las Piñas City, Muntinlupa City, Bacoor City and Dasmariñas City
Proponent Name	Prime Asset Ventures, Inc.	Proponent Address	UG/F Worldwide Corporate Center Highway Hills, Shaw Boulevard, Mandaluyong City
Proponent Contact Person	Tony Tan	Proponent Means of Contact	Landline: +632 226.3552 Local 1041 / Email: gecsmatt@yahoo.com
EIA Consultant	Seastems, Inc.	Consultant Address	Room 103 Virata Hall, E. Jacinto St. UP Diliman, Q.C.
EIA Consultant Contact Person	Mr. Alvin F. Nacu EIA Team Leader	Consultant Means of Contact	Landline: (632) 920.1706 / Fax No: (632) 920.1706 / Email:
EMB/DENR Scoping Representatives		Place of Public Scoping	Mayor's Hall, Parañaque City Hall
		Date of Public Scoping	18 February 2019

ISSUES/CONCERNS TO BE INCLUDED IN THE SCOPE OF THE EIA STUDY

EIA Module	Issues/Suggestions raised by stakeholder	Sector or Representative who raised the issue or concern	Proponent's Response
1. Project Description	Will you provide technical documents so stakeholders can study?	Engr. Alfredo Bugayong San Antonio BLGU	None yet. Project description was provided to barangay halls during IEC.
	Did project design consider climate change? Climate change as well as disaster risk reduction is a global concern that need to be addressed	Mr. Vic Macob City TMO	EMB requires proponents to include discussion on climate change concerns in relation to project development and implementation.
	Expected start of conatruction, how long it will take, inconvenience to Paranaque residents during construction?	Mr. Francisco Jamias Valley 1 HOA	Project construction will take three years to complete but will only start once all permits are secured. Project is still for NEDA approval and ECC is required for NEDA evaluation.
	City LGU has a proposal for a monorail. This project is an unsolicited proposal, so stakeholders should raise issues and concerns to be considered in project design.	Mr. Francis Tolentino Fourth Estate HOA	
	City LGU will require traffic management plan for construction. Contractors of several ongoing projects in the city leave construction wastes behind and city LGU is left to manage these wastes. City LGU would like contractors to manage those wastes and will make main contractor (like PAVI) liable for management of construction wastes.	Engr. Ma. Teresa Quiogue City ENRO	Environmental management plan will include solid waste (including construction waste) management during construction. Contracts between contractors and subcontractors will be included so that liability for waste management can be identified later on.
	Are the projects interconnected? Where will the project end along Dr. A. Santos Avenue?		Yes. LRT-6C will end at Lake Front along South Luzon Expressway.
	How will project acquire ROW in private properties?	Mr. Vic Macob City TMO	Land acquisition for infrastructure projects will depend on market price. Proponent will comply with Philippine laws attendant to land acquisition.
2. Land			

EIA Module	Issues/Suggestions raised by stakeholder	Sector or Representative who raised the issue or concern	Proponent's Response
3. Water	Aside from solid wastes, study should also address liquid waste management, which is normally discharged to canals and waterways.	Mr. Alvaro Bergabe Loyola Chapel	This will be included in the study.
	Squatting on waterways should not be allowed in order not to aggravate drainage and flooding concerns.	Mr. Francis Tolentino Fourth Estate HOA	This will be included in the study.
4. Air			
5. People	Fourth Estate only has one egress and ingress along Sucat Road/Dr. A. Santos Avenue. Construction of LRT-6 will impact residents of Fourth Estate.	Nanette Regala Fourth Estate HOA	HOA can help identify alternative access roads that residents can use during project construction.
	Compensation for damage to subdivision roads and infrastructure during project construction	Mr. Francis Tolentino Fourth Estate HOA	Prepare a position paper and submit to barangay and city LGUs; Consultant and LGU will help identify legal remedies for affected subdivisions and this can be included as part of environmental management plan or as ECC condition.
	Timing of implementation should be considered in tandem with existing projects. Consider livelihood displacement and aesthetic aspects. Subway can be more acceptable instead of elevated structure.	Engr. Bong Rivera CPDO	LRT 2 along Aurora Boulevard already considered experience in LRT 1 along Avenida by increasing elevation to minimize impacts to existing structures and establishments. Government is proactive in projects like this and improve based on experience from previous projects.
6. Others	Who will relocate informal settlers who have occupied existing roads that can be used as alternate routes of subdivision residents?	Nanette Regala Fourth Estate HOA	This is city LGU concern. Project will address this if this will affect ROW for project construction.
	Maybe the project can consider bridge connecting both sides of Laguna Lake to avoid traffic congestion on major roads (EDSA, etc.) connecting the northern and southern parts of Metro Manila.	Ms. Rosemarie Laman Fourth Estate HOA	This suggestion is noted and will be discussed in the report.
	Mass transportation is the solution to our traffic problems but affected stakeholders will have to bear with the inconvenience during construction.	Mr. Francisco Jamias Valley 1 HOA	Big projects nowadays prepare comprehensive traffic management plans to minimize inconvenience to affected stakeholders.
	Project should conduct a survey for identification of major traffic issues that should be addressed during project construction.	Mr. Francis Tolentino Fourth Estate HOA	This is noted.

Stakeholder Representatives:

Signature over printed name / Signature over printed name / Signature over printed name / Signature over printed name / Signature over printed name

Signature over printed name San Antonio Valley HOA	Signature over printed name Barangay San Antonio	Signature over printed name SM Group	Signature over printed name Fortunata Vill. HOA	Alvaro G. Bersabe Signature over printed name Loyola Chapels
Signature over printed name Brgy. ENRO	Signature over printed name Ramon Pascual Inst.	Alfredo A. Agor Signature over printed name San Isidro	Francis Tolentino Signature over printed name FEFDAI	Melencio Santos Signature over printed name San Dionisio Brgy. Kagawad

Observing EIARC Members

Name	Expertise	Signature	Name	Expertise	Signature

EIA PERSONNEL:

Signature over printed name
EMB-NCR

Signature over printed name

REPRESENTATIVES OF THE PROJECT PROPONENT

Signature over printed name

Signature over printed name

NOTED BY (EIAM Division Chief):

Signature over printed name

EIA CONSULTANTS:

Signature over printed name

Signature over printed name
Arwin F. N[illegible]

ATTENDANCE SHEET
PUBLIC SCOPING FOR LRT LINE-6A AND LINE-6B+C PROJECT
Parañaque City, 18 February 2019

No.	Name	Affiliation / Barangay	Signature
1.	Joselito C. Allanigue III	Engineering Dept.	[signature]
2.	Eyida Rio J. Quidr	MCPI / San Antonio	[signature]
3.	Rosemarie A. Lamar	Area 3, Fourth Estate	[signature]
4.	Linda A. Martin	– do –	[signature]
5.	Francis Tolentino	Fourth Estate	[signature]
6.	Adela D. Rabaza	Garcia Heights	[signature]
7.	Lilia Tyada	Garcia Hts	[signature]
8.	Francisco U Jamias	HASAV - 1	[signature]
9.	Alvaro G. Bersabe	Loyola Chapels	[signature]
10.	Gerry Jesus M. Balitaan	Loyola Chapel	[signature]
11.	Luzdeldia Regala	Fourth Estate Subd.	[signature]
12.	Jose Rener	Topland Subd.	[signature]

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
13.	Nelson Umacorta	Torpaid Grp	[signature]
14.	Jeff Mani	SM Group	[signature]
15.	Meray Balansag	Sampaloc Nutan Operators	[signature]
16.	Romy Hosmar Jr.	ESCI	[signature]
17.	Polly Valenzuela	ESCI	[signature]
18.	Gualberto F. Pernas Jr.	HASAV-1	[signature]
19.	Vic A. Macob	TPMO	[signature]
20.	Lito G. Aragon	Senior Pres. Fortunata VHOA	[signature]
21.	Felix Bercero	Esteto Rd HOA	[signature]
22.	Robin Calaje	RPI Ramon Pascual Institute	[signature]
23.	Engr. Ma. Teresa Quiogue	CENRO	[signature]
24.			
25.			
26.			

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
27.	Lony I. Rivera	[illegible]	[signature]
28.	Severino Mendoza Jr.	SM Supermall	[signature]
29.	Jhonel S. Sioted	DENR-EMB	[signature]
30.	Kgd. Melencio San Pedro	Brgy San Dionisio	[signature]
31.	Enrico M. Sarmiento	" "	[signature]
32.	Orlando Tiscan	Bgy. [illegible]	[signature]
33.	Jolo Rivera	" "	[signature]
34.	Raymund Garcia	La Huerta	[signature]
35.	Emmanuel V. San Mateo	Brgy Sto Niño / Kagawad	[signature]
36.	Engr. Alfonso S. Buenaventura	Brgy San Antonio	[signature]
37.	Jayson Genselga	Ligas ng Brgy	[signature]
38.	Alfred Agor	San Isidro	[signature]
39.	Antonio Ocava (Elorde Sports Ctr)	Brgy San Antonio	[signature]
40.	Jerry F. Gacute	Brgy Tambo	[signature]

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
41.	Charlie Reyes	San Isidro	
42.	JOSE VERDEFIDA	"	
43.	JR UMALI	"	
44.	EDITHA	SAN ISIDRO	
45.	Ma Rose Concillas	Brgy BF	
46.	Hilda P. Cadungog	BF	
47.	[illegible]	GSO	
48.	[illegible]	BS	
49.	Linda San Juan	Tombo	
50.			
51.			
52.			
53.			
54.			

Annex 3. Documentation of Public Scoping in Bacoor City

Project Name	LRT Line-6A and Line-6B+C Project	**Project Location**	Parañaque City, Las Piñas City, Muntinlupa City, Bacoor City and Dasmariñas City
Proponent Name	Prime Asset Ventures, Inc.	**Proponent Address**	UG/F Worldwide Corporate Center Highway Hills, Shaw Boulevard, Mandaluyong City
Proponent Contact Person	Tony Tan	**Proponent Means of Contact**	Landline: +632.226.3552 Local 1041 / Email: gocsmatt@yahoo.com
EIA Consultant	Seastems, Inc.	**Consultant Address**	Room 103 Virata Hall, E. Jacinto St. UP Diliman, Q.C.
EIA Consultant Contact Person	Mr. Alvin F. Nacu EIA Team Leader	**Consultant Means of Contact**	Landline: (632) 920.1706 / Fax No: (632) 920.1706 / Email:
EMB/DENR Scoping Repreesentatives		**Place of Public Scoping**	Revilla Hall, Bacoor City Hall
		Date of Public Scoping	19 February 2019

ISSUES/CONCERNS TO BE INCLUDED IN THE SCOPE OF THE EIA STUDY

EIA Module	Issues/Suggestions raised by stakeholder	Sector or Representative who raised the issue or concern	Proponent's Response
1. Project Description	We noticed a curve from Molino Boulevard to privately controlled properties. What areas will be affected?	Atty. Jessie Salvador City Engineering Office	From Niog 3, alignment will turn towards San Nicolas 2 and Molino 6 on privately controlled properties.
	Possible conflict with ongoing DPWH flyover project along Bacoor-Dasmarinas Road from Springville to SM Bacoor	Atty. Jessie Salvador City Engineering Office	This is noted and will be considered in project design.
	Will project affect Marcos Alvarez Avenue?		Project alignment in Las Pinas will pass through sections of Marcos Alvarez Avenue.
	Several roads passing through subdivisions in Molino 3 are narrow.		This has been noted during ocular visit of project alignment.
	Molino Road is a very busy road used by several residents as well as schools and other establishments in the area. Traffic will worsen during construction.	Kag. Sabater Barangay Molino 3	This is noted. Comprehensive traffic management plan will address this concern.
	Widening on Molino-Paliparan Road, about additional two lanes on both sides in preparation for DPWH flyover project.		This is noted and will be considered in project design.
	Exact location of project alignment so we will know impact areas in our barangays.	JR Dominguez Molino 1	In Molino 1, boundary of Molino 1 will be affected (Orientville area). Molino Road alignment will only pass through southern side of barangay.
	Bacoor is currently updating its CLUP. We would like to know when project will be implemented so we will know which areas will be affected and therefore should not be allowed for development.	Engr. Jess Francisco CPDO	Project is unsolicited proposal and will still need NEDA approval. The project also has to secure several permits from several government agencies. It may take about 3-5 years for permitting but this is not definite and dependent on government approvals.
	Will project pass through Molino-Paliparan Road from Molino to Salawag?	Ms. Issa Statefields School	Yes
	How long will construction take?	Mr. Jose Guinto Barangay Ligas 2	Two years for preparation and about three years for construction.
	Is there a station near Bacoor City Hall? There does not seem to be a station near the government center in the map.	Atty. Jessie Salvador City Engineering Office	There is a proposed City Hall station for LRT 6-A, but exact location has not been determined at this time.
	Stations should be accessible to people of Bacoor and should be considered in finalizing the location of LRT-6 stations. It is good that people are being consulted at this time so they can give their inputs that can be considered in the project design. More discussions with project stakeholders in the future.	Arch. Neil Tavu Bacoor City Consultant	More stakeholders are encouraged to attend in future consultations such as the public hearing. More consultations can also be conducted after ECC issuance and NEDA approval.
	Provision of public transportation terminal on selected or all LRT 6 stations.	Arch. Neil Tavu Bacoor City Consultant	This is noted and will be considered.
2. Land			
3. Water			
4. Air			
5. People			
6. Others	Technical impact of project such as on drainage and sewer lines, vibration, noise, sound, magnetic intervention, etc. These will impact results of MRI and other medical tests.	Engr. Jaime Dilidili St. Dominic Medical Center	This will be considered in the study. Several hospitals are also located along EDSA where MRT-3 is located so we hope that this
	Bacoor Boulevard instead of Molino Boulevard	BHOACI	This is noted.
	IEC for each impact barangay to let everyone know about the project. Post maps showing impact areas per barangay. Baseline data for all environmental parameters should be part of study. Creation of MMT and submission of quarterly SMR and semi-annual CMVR.	Mr. Jess Ramos EMB 4A	This is noted.

Stakeholder Representatives:

Atty. Jessie A. Salvador Signature over printed name City Engineering Office	Leandro De Leon Signature over printed name [illegible]	Jesus Francisco Signature over printed name CPDO	[illegible] Signature over printed name Brgy. [illegible]	[illegible] Signature over printed name [illegible]
Edward D. Sabater Signature over printed name Brgy. Molino 3	Jeo M. Dominguez Signature over printed name Brgy. Molino 1	Bonifacio Francisco Signature over printed name Brgy. San Nicolas 1	Heidi Mendoza Signature over printed name Brgy. Ligas 3	[illegible] B. Del Rosario Signature over printed name BTMP

Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name

Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name

Observing EIARC Members

Name	Expertise	Signature	Name	Expertise	Signature

EIA PERSONNEL:

Signature over printed name | Signature over printed name

REPRESENTATIVES OF THE PROJECT PROPONENT

Signature over printed name | Signature over printed name

NOTED BY (EIAM Division Chief):

Signature over printed name

EIA CONSULTANTS

Signature over printed name | Signature over printed name

ATTENDANCE SHEET

PUBLIC SCOPING FOR LRT LINE-6A AND LINE-6B+C PROJECT

Bacoor City, 19 February 2019

No.	Name	Affiliation	Signature
1.	ANA LIZA S. MARANOC	Statefields School, Inc.	
2.	Elmer G. Jimenez	Barangay Affairs Office	
3.	TAN MA THERESA	PHIACI	
4.	BENITO CORA ...	BHOACI	
5.	JOSHUA NAVARRO	VP ST. MICHAEL HOSPITAL	
6.	RAYMOND ORCENA	SP	
7.	Jesus Francisco	CPDC	
8.	JOMELENE DEL MUNDO	RFC MALL	
9.	Inocencio Jesus S. Ramos	EMB-R4A	
10.	Reynold L. Dires	SPVH PS	
11.	ARISTEO C. PEREZ	CAMELLA LESSANDRA HEIGHTS PRESIDENT / PEARL HARB	
12.	JOSEPH CALDERON	SPVH PS	

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
13.	Estrella F. Banang	BOD-Pres. CLMHA	
14.	ORLY Y. SAMSON	KAGAWAD-MOLINO	
15.	RETALIA LDI O. MADEJA	MOLINO HOMES PRES	
16.	CARLITO P. SALA	MOLINO HOMES FDP	
17.	ARSENIO A PASTOR JR	TREA. MOHAODA	
18.	JOSE V. GUINTO	SEC. LIGAS-II	
19.	PERCIVAL R. MAPOY	ST. DOMINIC MEDICAL CENTER, INC.	
20.	GERONIMO B. DEL ROSARIO	BTUD	
21.	ADEL LIDARDE	BTMD	
22.	julieta anaya	P/B talaba 4	
23.	DOMINGO P. OCH JR	TALABA 4 KGWD	
24.	Aurora C Sarreal	Justice	
25.	LORENZO SCRAUCEN C.	HOA PRES	
26.	ROLANDO P. BACAR	HOA Vice Pres	

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
27.	Rolando Vergara	WQRHAI	
28.	ATTY. JESSIE A. SALVADOR	Engineering	
29.	JESS CAMAYA	PHS. 14 HOA	
30.	SONNY FRANCISCO	P/B SAN NICOLAS I	
31.	EDWARD D. SABATER	KAGAWAD MOLINO III	
32.	GRACIA D. BARIA (SEC)	MOLINO II	
33.	ANNALYN E. FLORES	MOLINO III	
34.	PASTOR B. SACLUYO	MOLINO III	
35.	JAIME A. VILLOLLI	Eng'g Staff SDMC/SDCA	
36.	LEANDRO DE LEON	S.P. COMMITTEE ON PUBLIC WORKS	
37.	PABLO N. MORALES	LIGAS III	
38.	Heidi Mendoza	Ligas 3 -Sa	
39.	Arch. Neil C. Tavu	Bacoor City	
40.	Rainy Lucena	Kabisig MPTSC	

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
41.	Francisco M. Pasig	Kalusia MPTSC	
42.	P.B. ALFIE GAWARAN	P.B	
43.	Anne Lingaspi	LNB STAFF	
44.	BGO FELIZARDO	MALUKSI I	
45.	LIMUEL GUIBAN	TALABA II	
46.	ROSALINE CAHAMAG		
47.	Angelica Endere	Queens Row	
48.	Mark Glenn V. Lacdao	San Nicolas I	
49.	Allan Villanueva		
50.	Lyan Vidal		
51.	RITCHIE ARELLANO		
52.	Janice R. Casilas	Niog 3	
53.	Myla Medina	F&E De Castro/Ho	
54.			

Annex 4. Documentation of Public Scoping in Dasmariñas City

Project Name	LRT Line-6A and Line-6B+C Project	**Project Location**	Parañaque City, Las Piñas City, Muntinlupa City, Bacoor City and Dasmariñas City	
Proponent Name	Prime Asset Ventures, Inc.	**Proponent Address**	UG/F Worldwide Corporate Center Highway Hills, Shaw Boulevard, Mandaluyong City	
Proponent Contact Person	Tony Tan	**Proponent Means of Contact**	Landline: +632.226.3552 Local 1041	Email: gecsmatt@yahoo.com
EIA Consultant	Seastems, Inc.	**Consultant Address**	Room 103 Vrata Hall, E. Jacinto St. UP Diliman, Q.C.	
EIA Consultant Contact Person	Mr. Alvin F. Nacu EIA Team Leader	**Consultant Means of Contact**	Landline: (632) 920.1706	Fax No: (632) 920.1706 Email:
EMB/DENR Scoping Representatives		**Place of Public Scoping**	Island Park Mango Grove Clubhouse, Dasmariñas City	
		Date of Public Scoping	19 February 2019	

ISSUES/CONCERNS TO BE INCLUDED IN THE SCOPE OF THE EIA STUDY

EIA Module	Issues/Suggestions raised by stakeholder	Sector or Representative who raised the issue or concern	Proponent's Response
1. Project Description	Is this project interconnected with other MRT/LRT lines? There should be interconnection and seamless integration between these public infrastructures. Is the project independent of the LRT-1 extension? How soon can the project be implemented?	VM Rex Mangubat	The project is designed in such a way that the starting point of LRT-6A at Niog station is at the end point of LRT-1 extension. Yes. Hopefully LRT-1 extension has been completed by the time LRT-6 is ready for implementation. It will take about 3-5 years for permitting and implementation.
	Why did the project alignment veer away from Molino Blvd? Alignment should follow Molino Road alignment.	SPM Dela Cuesta	This is part of project design and will be explained by the proponent in the document.
	Maybe the presented alignment is less problematic and will entail minimal ROW acquisition rather than following the straight road alignment.	Engr. Momar Santos	This is noted.
	Maybe, one way to address possible ROW issues to build the structure on the shoreline and connect it to PITX perhaps.	VM Rex Mangubat	This suggestion is noted.
	How much ROW is required at Molino Road? Construction of piers/columns on this road will require road widening to accommodate both the proposed infrastructure and vehicles using this road.	Ms. Mina India Rosario College	This is noted. Coordination with the LGU, DPWH and other concerned stakeholders will be done to discuss these issues.
	Is there a single project proponent for all alignments presented earlier? Does this mean that people using this infrastructure will not have a problem transferring from one line to the other lines.	Kag. Miraflores Paliparan II	Yes, PAVI is the proponent for LRT-6A and LRT-6B+C.
2. Land			
3. Water			

EIA Module	Issues/Suggestions raised by stakeholder	Sector or Representative who raised the issue or concern	Proponent's Response
4. Air			
5. People			
6. Others	Most roads in Paliparan 1, 2 and 3 were constructed on privately owned properties and owners have not been compensated by the government.	Kag. Tagle Paliparan I	This issue will be referred to the concerned government agency with the assistance of DENR.
	Issues raised during the project scoping will be discussed during the technical scoping.	Mr. Jess Ramos DENR 4A	
	Maybe establishments located along the road should observe the proper setback so that ROW will not be a problem during project implementation.	Engr. Momar Santos	This is noted.

Stakeholder Representatives:

Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name

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Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name

Observing EIARC Members

Name	Expertise	Signature	Name	Expertise	Signature

EIA PERSONNEL:

Signature over printed name | Signature over printed name

REPRESENTATIVES OF THE PROJECT PROPONENT

Signature over printed name | Signature over printed name

NOTED BY (EIAN Division Chief):

Signature over printed name

EIA CONSULTANTS:

Signature over printed name | Signature over printed name

ATTENDANCE SHEET
PUBLIC SCOPING FOR LRT LINE-6A AND LINE-6B+C PROJECT
Dasmariñas City, 19 February 2019

No.	Name	Affiliation	Signature
1.	MERIAN SANGRIA	PALIPARAN I	
2.	FELICIANO SARIMOS	PALIPARAN I	
3.	PRINCESS CANDADA	PALIPARAN I	
4.	ERNESTO M. SANTIAGO	PB PALIPARAN II	
5.	FREDDIE C. MIRAFLORES JR.	KAGAWAD PAL. 2	
6.	FELIPE C. ANDAYA	KAGAWAD PAL. 2	
7.	GILBERTO F. MAGTIBAS	KAGAWAD PAL. 2	
8.	EDUARDO R. PUENTA	BRGY. SECRETARY PAL-2	
9.	Roberto Tiopes	DM[illegible] PAL. 2	
10.	ARCH. ZERMAN DAYANG	PROSPER VENTURE	
11.	ENGR. KEN SAUCEDA	PROSPER VENTURE	
12.	ENGR. EDUARDO ALVAREZ	PROSPER VENTURE	

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
13.	F. C. DELA CUESTA, JR.	DASMARIÑAS SPM	
14.	REY CANANEY	SPM DASMARIÑAS	
15.	WILLSON A. YEE	TMB [illegible] TRAFFIC	
16.			
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Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
27.	[illegible]	[illegible]	
28.	[illegible]	[illegible]	
29.	[illegible]	[illegible]	
30.	[illegible]	[illegible]	
31.	[illegible]	[illegible]	
32.	[illegible]	[illegible]	
33.	[illegible]	[illegible]	
34.	[illegible]	[illegible]	
35.			
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Annex 5. Documentation of Public Scoping in Las Piñas City

Project Name	LRT Line-6A and Line-6B+C Project	**Project Location**	Parañaque City, Las Piñas City, Muntinlupa City, Bacoor City and Dasmariñas City
Proponent Name	Prime Asset Ventures, Inc.	**Proponent Address**	UG/F Worldwide Corporate Center Highway Hills, Shaw Boulevard, Mandaluyong City
Proponent Contact Person	Tony Tan	**Proponent Means of Contact**	Landline: +632 226 3552 Local 1041 / Email: gecamatl@yahoo.com
EIA Consultant	Seastems, Inc.	**Consultant Address**	Room 103 Virata Hall, E. Jacinto St. UP Diliman, Q.C.
EIA Consultant Contact Person	Mr. Alvin F. Nacu EIA Team Leader	**Consultant Means of Contact**	Landline: (632) 920.1706 / Fax No: (632) 920.1706 Email:
EMB/DENR Scoping Representatives		**Place of Public Scoping**	Villar Sipag Hall, Las Piñas City
		Date of Public Scoping	20 February 2019

ISSUES/CONCERNS TO BE INCLUDED IN THE SCOPE OF THE EIA STUDY

EIA Module	Issues/Suggestions raised by stakeholder	Sector or Representative who raised the issue or concern	Proponent's Response
1. Project Description	Will all lines be constructed simultaneously? Will the Las Pinas line constructed first since it is closest to Metro Manila?	Coun. Renan Riguero Sangguniang Panlungsod	Project timeline is to secure permits within one to two years and construction will take about 3-4 years. Proponent will touch base with LGUs and concerned stakeholders prior to project implementation particularly on traffic management.
	Alabang Zapote Road is like EDSA where traffic is heavy all day. This project is welcome in terms of provision of mass transportation. Did the proponent coordinate with DPWH regarding flyover projects in Alabang-Zapote Road at the corner with CAA and Marcos Alvarez? Flyover height is 4.5m so LRT-6 should consider this. Sewer line project is also planned. These projects of other agencies should be considered. Road widening may be necessary to occupy all these proposed infrastructure projects in the city.	Coun. Danny Hernandez Sangguniang Panlungsod Public Works Committee	The same issues have been raised in other LGUs traversed by the project. These concerns will be referred to the engineering group for consideration in the project design. The proponent will also discuss these projects with the concerned government agencies and private groups. DENR will also invite resource persons from various government departments during the EIA review so that issues and concerns will be addressed prior to project commencement.
	Project planning, detailed engineering plans and bidding for project construction will take time to complete. How frequent is the construction meeting and who will attend this meeting?	Kgd Ronny Bautista Pamplona Tres	Detailed project details can be presented during public hearing. Project details before and during project implementation can be disseminated by the project's community relations team.
	Is this a national government project?	Kap. Ruben Sanchez Talon Dos	PAVI submitted an unsolicited proposal to DOTr, which forwarded the proposal to NEDA for approval. The project is a PPP between PAVI and DOTr.

EIA Module	Issues/Suggestions raised by stakeholder	Sector or Representative who raised the issue or concern	Proponent's Response
2. Land			
3. Water			
4. Air	The project will traverse a highly residential area with some commercial areas. The project will have impacts that will affect all residents. These include traffic, noise, dust generation and waste management. The EIA study will help us explain better to HOA residents the project impacts to our residents.	Citadella HOA	The EIA will have a section on Environmental Management Plan which will enumerate mitigating measures to address identified project impacts. During the technical scoping, the EIA review committee members will require technical studies including noise, vibration, etc. The EIA becomes a public document once it is submitted to DENR. Stakeholders can ask a copy from DENR. Necessary sections can be provided to interested stakeholders. Stakeholders are encouraged to attend the public hearing to find out about the results of the EIA study.
5. People	Will the project affect establishments and residents along Marcos Alvarez?	Golden Acres School	This will be addressed in the EIA study.
	CAA Road is narrow. How long is the project construction? This will impact resident TODA members and may eliminate or phase out their route.	Kgd. Jimmy Aborque Brgy. CAA	This is a major project concern and will be assessed during the EIA study
	What will happen during construction? This can impact establishments along the project alignment, particularly our hospital. Will the proponent regularly inform us about the project schedule?	Las Pinas Medical Center	Proponent will form a community relations team for each project area. This group will be responsible for finding out about stakeholder issues and concerns and dissemination of project information to concerned stakeholders. DENR will also require the proponent to monitor dust levels and other critical environmental parameters during construction to ensure that levels are within DENR standards.
	What will happen to our road access along CAA Road and BF when the project is implemented? When can we know the project milestones so we can also prepare? Alabang-Zapote Line will also affect us and will leave us no access road.	Ms. Carol La Serna Southville International School and Colleges	The project will have a transport and traffic study and prepare a traffic management plan during project construction. Timeline cannot be firmed up at this time since we are still in the early stages of the project. It will be recommended for the proponent to regularly inform project stakeholders about project timeline.
	This project can have impact on our deliveries and business operation. We request that there will be an efficient traffic management plan during the construction phase. The project may also consider our products during project construction and maintenance. We also request the proponent to be more responsible in complying with ECC conditions and overall project management to minimize	Darwin de Lima Sika Philippines	The points are well taken. Participation of the city and barangay LGUs and other stakeholders in the MMT is also encouraged so that project monitoring can be more comprehensive.

EIA Module	Issues/Suggestions raised by stakeholder	Sector or Representative who raised the issue or concern	Proponent's Response
	inconvenience to road users and establishments along the project alignment.		
	Many of the members of our TODA may lose livelihood during project implementation. Why did the project alignment pass through CAA Road instead of other roads in Las Pinas?	Elmer CEBM TODA	Possible loss of livelihood is noted and will be included in the assessment of project impacts. Project alignment has undergone a feasibility study technical concerns and practicality have been analyzed. Suggestions will be noted and can be considered to make the project design more responsive to needs and concerns of project stakeholders.
6. Others	Who will be involved in the monitoring during project construction? How will concerns and complaints about the project be communicated to the proponent and concerned government agencies?	Engr. Leonida Lagrisola CPDO	Multi-partite monitoring team (MMT) will be formed prior to start of project construction. MMT will be composed of LGU representatives (city and barangay), project proponent, POs/NGOs, private sector, concerned government agencies and other project stakeholders. Proponent will also be required to submit quarterly SMR and semi-annual CMR. MMT will also evaluate project compliance to environmental management and monitoring plan (EMMoP) and will prepare CMVR. MMT meets quarterly. The project is still at the scoping stage. DENR will invite technical reviewers from various sectors to check that the EIS has addressed possible project impacts and all recommendations for environmental management will be implemented by the proponent. DENR and project stakeholders should continuously monitor project compliance to EMMoP.

Stakeholder Representatives:

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Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name

Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name

Observing EIARC Members

Name	Expertise	Signature	Name	Expertise	Signature

EIA PERSONNEL:

Signature over printed name

Signature over printed name

REPRESENTATIVES OF THE PROJECT PROPONENT

Signature over printed name

Signature over printed name

NOTED BY (EIAM Division Chief):

Signature over printed name

EIA CONSULTANTS:

Signature over printed name

Signature over printed name

ATTENDANCE SHEET

PUBLIC SCOPING FOR LRT LINE-6A AND LINE-6B+C PROJECT

Las Piñas City, 20 February 2019

No.	Name	Affiliation	Signature
1.	EVELYN E. TAMIL	AVIDA TOWERS SUCAT	
2.	Mars B. CAJA, JR.	" " "	
3.	ROMEO STA. TERESA JR.	MALVIO TRANS / TRAVEL CORP.	
4.	JULIAN BONZON	CEBMTODA	
5.	KGWD RONNY BAUTISTA	Brgy Pamplona 3	
6.	DANILO M. ZAFE	TRAFFIC	
7.	ARMANDO Q. NEVIAL	PLANNING - LAS PIÑAS	
8.	SAMUEL D. DEASIS	CEBMTODA	
9.	Edwin D. Malandog	CEBMTODA	
10.	[illegible]	CEBMTODA	
11.	Kap Ruben Pogi Y. Sanchez	Brgy Chairman Talon Dos	
12.	ROCALIE N AGUILAR	BRGY PILAR VILLAGE 2	

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
13.	[illegible] B. [illegible]	BRGY. PILONG LUPA 2	
14.	MICHAEL T. AGUILAR	EVEC	
15.	AIRNI D. AMBAY	OFFICE of COLLN. PEEWEE AGUILAR	
16.	DARWIN DELIMA	SIKA PHILS.	
17.	Aldrin Oasan	Sika Phil.	
18.	Kgd. Jimmy P. Abarque	Brgy. CAA/BF Int'l	
19.	Kgd. LUIS CUIZON	BRGY CAA	
20.	ROGER D. CAPINA	Brgy CAA	
21.	Kag. Israel B. Rosales	Brgy BF/CAA	
22.	Kag. MANDY N. SABAYAN	Brgy. BF Int'l/CAA	
23.	Ma. Teresa Calapatia	Brgy. B.F Int'l/CAA	
24.	JOEL D. CRYSTAL	BRGY BF/CAA	
25.	JEM BAÑARET	BRGY BF/CAA	
26.	RICARDO R. VILLAMAYOR	BRGY BF/CAA	

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
27.	MONRIE MOLINA	CEBM TODA BF CAA LP CITY	
28.	JUAN RICAFRENTE	CEBM TODA BF CAA LP CITY	
29.	JC NARCISO	ARARO PHILS CORP.	
30.	RAM CARPIO	ARARO PHILS CORP.	
31.	SHEILA L. PORRAS	DepEd Golden Acres Nat'l H.S	
32.	REYNALD C. PALAGULAN	CITY MANAGER'S OFFICE	
33.	ROMEO II. CALANZA	CETODA	
34.	IGNACIO M. OMAY	" "	
35.	LADISLAO MONTALBO JR	" "	
36.	REMILIO PEDUTEM	" "	
37.	EFREN MARIANO JR.	"	
38.	ABNER GALLO	"	
39.	OPEMIANO, LEONCIO A.	"	
40.	Gray Rosales	Tas Corp of Companies	

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
41.	ANTHONY D. CRUZ	SM	
42.	AIDA R. MANALASTAS	CASIMIRO 3	
43.	EDUARDO BRAGA	CASIMIRO 3	
44.	Elmer V. Sison	CEBMTODA	
45.	danny V. hernandez	City Council	
46.	RAMON M. RACOMA	BRGY ALMANZA UNO	
47.	FERDINAND L MEDINA	BRGY ALMANZA UNO	
48.	GODOFREDO N GUEDALA	BRGY ALMANZA UNO	
49.	RENAN RIGUERA	LP-CITYHALL	
50.	JOEL M. RAGO	FINE PROPERTIES	
51.	JESS NIDUA	CITTADELLA VILLAGE	
52.	JOJO TALA-OGON	CITTADELLA VILLAGE	
53.	JOHN BARRIENTOS	CITTADELLA VILLAGE	
54.	SID BENAVIDEZ	Robinson Las Piñas	

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
55.	nanettecerna61@gmail.com NANETTE CERNA, P.C.O/Admin. Assist	Las Piñas City Medical Center	
56.	ARSAE A. BUNAY	SISC	
57.	Carolina R. Lacerna	Smithville	
58.	Engr. Nida Logrisola	Planning LGU	
59.	Sr. Ph. Domingo S. Plomante Jr.	Brgy Talon I	
60.	Juliet N. Palmiano	Alabang Transport	
61.	BAMBI A. SANTA ANA	SM SOUTHMALL	
62.	LEONEL S. SIAPNO	EMB NCR	
63.	JOVITO A. FERNANDEZ	CEBMTODA	
64.	JOJO RIVERA	CEBMTODA	
65.	ANDY N. ROBLES	PLANNING	
66.	Kgd. Eman Magat	Brgy Manuyo Y	
67.			
68.			

Annex 6. Documentation of Public Scoping in Muntinlupa City

Project Name	LRT Line-6A and Line-6B+C Project	Project Location	Parañaque City, Las Piñas City, Muntinlupa City, Bacoor City and Dasmariñas City
Proponent Name	Prime Asset Ventures, Inc.	Proponent Address	UCPI Worldwide Corporate Center Highway Hills, Shaw Boulevard, Mandaluyong City
Proponent Contact Person	Tony Tan	Proponent Means of Contact	Landline: +632 226.3552 Email: gecsmett@yahoo.com Local 1041
EIA Consultant	Seastems, Inc.	Consultant Address	Room 103 Vrata Hall, E. Jacinto St. UP Diliman, Q.C.
EIA Consultant Contact Person	Mr. Alvin F. Nacu EIA Team Leader	Consultant Means of Contact	Landline: (632) 920.1706 Fax No. (632) 920.1706 Email:
EMB/DENR Scoping Representatives		Place of Public Scoping	Max's Restaurant, Westgate Center Alabang, Muntinlupa City
		Date of Public Scoping	20 February 2019

ISSUES/CONCERNS TO BE INCLUDED IN THE SCOPE OF THE EIA STUDY

EIA Module	Issues/Suggestions raised by stakeholder	Sector or Representative who raised the issue or concern	Proponent's Response
1. Project Description	How long will construction take and how do you plan to address traffic management?	Ms. Michelle Ragpa Dona Rosario Heights, Sucat	According to the timeline, construction will take about three years. Since the project has four alignments, construction will be done in phases. To address the concern on traffic, the proponent will work together with the LGUs to devise a traffic management plan for sections of the alignment that will be affected during project construction. Comprehensive traffic study will be done to determine impacts to various project stakeholders including residents, establishments, institutions, transport groups, etc.
	Independent traffic impact assessment (TIA) should be done to determine project impact to traffic flow before, during and after project construction.	Mr. Don Nolasco Muntinlupa TMB	The need for a TIA will be determined during the technical scoping with the DENR EIA review committee.
	The scoping seems to be lacking since information provided to the invited stakeholders is not sufficient. The best option or model should be implemented. The project will have impacts on traffic, existing vegetation, etc.	Coun. Marissa Rongavilla Muntinlupa LGU	Project information were provided to the impact LGUs (city and barangay) in October and November 2018. The scoping is part of the EIA process where the proponent will present the project to identified project stakeholders. Subsequent consultations will be done after completion of the EIA study where information on project impacts to land, air, water, and people will be presented.
	Scoping will be more fruitful if more information is provided and more people are involved.	Coun. Marissa Rongavilla Muntinlupa LGU	This is noted.
	Bigger consultation should be done after technical study so more people will be aware about the project.	Ms. Tess Navarro Muntinlupa PIO	This is noted.
	More project details should be provided so people can give better feedback about the project.	Ms. Michelle Ragpa Dona Rosario Heights, Sucat	This is noted.

EIA Module	Issues/Suggestions raised by stakeholder	Sector or Representative who raised the issue or concern	Proponent's Response
	Limited information has been provided so we cannot give comments in terms of environmental impact. The project will have huge impacts on air, traffic, and other environmental concerns. More project details should be presented in succeeding consultations. The location of the terminal will have a huge impact to Brgy. Alabang.	Mr. Dave Martinez Brgy. Alabang Engg. Dept.	This is noted.
	We need to know location of stations and piers in order for us to determine the project impacts.	Coun. Marissa Rongavilla Muntinlupa LGU	This is noted.
	Skyway extension or expansion should be considered by the project. Is there a plan for road widening in Alabang-Zapote Road to accommodate this project and the existing road traffic (~50,000 vehicles/day)?	Mr. Don Nolasco Muntinlupa TMB	Inter-agency coordination will be done to determine solutions for these concerns.
	A schematic diagram of the project alignment will be a big help for us to determine the project impacts to our barangay.	Mr. Dave Martinez Brgy. Alabang Engg. Dept.	This is noted.
2. Land	Seismic analysis should be done to determine project location in terms of the existing fault line in Muntinlupa.	Arch. Eugene Ragpa Dona Rosario Heights, Sucat	EIA study will include EGGAR and geotechnical study.
	City has a zoning ordinance which determines which areas are not allowed for development and which areas have future development projects. LGU also requires project proponents to submit a third party Traffic Impact Assessment.	Mr. Pitz Adriano CPDO	This is noted.
3. Water			
4. Air	Is there an option for an underground railway instead of an overhead railway system? Lakefront is near our residence so having a station there will generate a lot of noise in our area.	Arch. Eugene Ragpa Dona Rosario Heights, Sucat	The project underwent a feasibility study where several concerns and parameters were considered. The study identified the initial alignment and station locations. An overhead railway is more feasible compared to an underground railway.
5. People			
6. Others	The project will impact on FLI's development plan so we would like to know when we can have more project details.	Arch. Louie Lava Filinvest Alabang	Meetings can be scheduled with select stakeholder groups to discuss these issues and concerns.
	Information can be shared on the LGU's social media platform to generate more reaction about the project.	Ms. Tess Navarro Muntinlupa PIO	This is noted.

Stakeholder Representatives:

Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name

Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name | Signature over printed name

Observing EIARC Members

Name	Expertise	Signature	Name	Expertise	Signature

EIA PERSONNEL:

Signature over printed name | Signature over printed name

REPRESENTATIVES OF THE PROJECT PROPONENT

Signature over printed name | Signature over printed name

NOTED BY (EIAM Division Chief):

Signature over printed name

EIA CONSULTANTS

Signature over printed name | Signature over printed name

ATTENDANCE SHEET

PUBLIC SCOPING FOR LRT LINE-6A AND LINE-6B+C PROJECT

Muntinlupa City, 20 February 2019

No.	Name	Affiliation	Signature
1.	Fe G. Bolivar	Alabang Yhealth Center	
2.	DANIDON M. NOLASCO	LGU - MUNTINLUPA	
3.	Engr. DANIEL BAYONA II	LGU - MUNTINLUPA	
4.	ENGR. PETER DATA	SAN BEDA ALABANG COLLEGE	
5.	Davide Martinez	Brgy Alabang	
6.	CHARISMA ODONO	Brgy alabang	
7.	ALEJANDRO VILLANUEVA	BRGY ALABANG	
8.	NARCISO ESCARILLA	SECRETARY OF MCCHRP	
9.	[illegible]	[illegible]	
10.	SPO4 Rey T. Templonuevo	PNP	
11.	Rexelito Forto	Motto	
12.	Arch. Luic S. Lava, Jr.	Filinvest Alabang Inc.	

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
13.	Djamaine Chesnel Chan	Filinvest Alabang Inc.	
14.	Ma. Alaija Perez		
15.	Tony Tan		
16.	SO Romualdo Talavera	South Station Terminal	
17.	ELIZABETH MAGPANTAY	LGU - ENGG.	
18.	NOEL B. MOLERA	ENGG. OFF. - LGU	
19.	Marissa C. Rongavilla	SP	
20.	Ma. Sheila S. Tolden	SP	
21.	JOSE DAVID E. ADRIANO	CPDO	
22.	TEZ V. NOLASCO	PIO	
23.	WILLIAM TIM CABRERA	EPWRO	
24.	RANIER A. BARLAW	EPWRO	
25.	ELIJAH O. SANTOS	EPWRO	
26.	ENGR. ANDREI M. ARGANA	EPWRO	

Attendance Sheet for Public Scoping for LRT Line-6A and Line-6B+C Project

No.	Name	Affiliation	Signature
27.	PSUPT DENAHARCA, JOE WILZAL	Muntinlupa PNP, PSS	
28.	PO1 DOMINGUEZ, FERNAND P.	PNP PSS	
29.	Pol Fajette Esguerra	PNP, PSS	
30.	PO3 TACSON EDWIN	PNP PSS	
31.	KEN MARTINEZ	DRHS	
32.	EUGENE RAGPA	DRHS	
33.	CIELO SAAGPA	DRHS	
34.	RONI ARCEMAS	ATC Alabang Town Center	
35.	KENNETH MAFTIRA	ATC	
36.	LORNA B. MISA	ESC / EPWRO City Gov't.	
37.	MA. LUISA M. ASTROLABIO	BRGY. SUCAT MUNTI CITY	
38.	MANUELICO L. FLORES	BRGY. SUCAT MUNT.	
39.	FERDINAND A. LARCE	BRGY. SUCAT M.C	
40.			

Appendix 10. Technical Scoping Checklist.

GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

☐ 1st ☐2nd ☐3rd ___th Screening

Date Submitted for Screening: _____
Form of Submission: ___ Hard ___ Digital
Project Title: **LRT Line-6A and Line-6B+C Project**
Project Location: **Parañaque, Las Piñas and Muntinlupa Cities in Metro Manila and Bacoor and Dasmariñas Cities in Cavite Province**
Project Proponent: **Prime Asset Ventures, Inc.**
Authorized Representative: **Mr. Tony Tan**
Address: **UF/G Worldwide Corporate Center, Highway Hills, Shaw Boulevard Mandaluyong City**
Contact No: **02 226 3552 loc 11041** Fax No: _____ Contact Person:
EIS Consultant: **Seastems, Inc.**
Address: **Room 314 PSSC Bldg, Commonwealth Ave, Diliman, Quezon City**
Contact No: **+632 998 0947** Fax No: _____ Contact Person: **Armie Perez**
Project Category & Type *(based on Annex A of MC 2014-005 Guidelines)*: **On-grade railway system**
Project Size *(use parameter in Annex A of MC 2014-005 Guidelines)*: **52.2 kms**

Project Status *(Please Check)*:
X New Project
__Existing Year of Establishment: ____

With Previous ECC? *(Please check)* __Yes X No

If with Previous ECC, Date/s of Issuance and Reference Code/s: *(List in chronological order)*

Date/s of Issuance: _____ Reference Code/s: _____

Date of Technical Scoping: _____
Venue of Technical Scoping: **EIAMD Conference Room,2nd Floor EMB Bldg.,DENR Compound,Visayas Ave, Quezon City**

Table 1. Checklist of Documentary Requirements
Boxes and blanks in the first column are to be filled-up during scoping and the rest, upon submission of EIS for screening

	Acceptable?		Screening Officers' Remarks
	Yes	No	
Check required EIA Report[1] X Environmental Impact Statement (EIS) ☐ Environmental Performance Report and Management Plan (EPRMP) *(include photographs or plates of project site, impact/affected areas and communities and land-use plan showing compatibility of the proposed project)*			
Proof of Authority over the Project Site ☐ TCT ☐ Lease Agreement X Others: Original proponent Status			
Accountability Statements of Preparers & Proponent (see Annexes 2-21 & 2-22 of Revised Procedural Manual for DAO 2003-30)			
Duly Accomplished Project Environmental Monitoring & Audit Prioritization Scheme (PEMAPS) Questionnaire (see Annex 2-7d of Revised Procedural Manual for DAO 2003-30)			
For EPRMP, Copy of previous ECC			N/A
For EPRMP, Proof of compliance in the submission of monitoring reports			N/A

[1] *Please refer to attached checklist of EIS/EPRMP Contents*

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

☐ 1st ☐2nd ☐3rd ___ th Screening

ACTION TAKEN: (Please check to indicate corresponding action taken)

- ☐ Document accepted; please submit ___ copies
- ☐ Document not accepted

NOTED BY:

Screening Officer
Division

Section/Division Chief

EMB Office
Screening Office

Date: _____

GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

☐ 1st ☐2nd ☐3rd ___th Screening

Table 2. EIS/EPRMP Annotated Outline

Sections / Subsections	Content	Page #	Acceptable?	REMARKS
Executive Summary (maximum of 10 pages)				
Project Fact Sheet	Summary of Project Description			
Process Documentation	Documentation of the process undertaken in the conduct of EIA. *(EIA Team, EIA Study Schedule & Area, description of key EIA Methodologies including sampling and measurement plan, Scoping and Public Participation)*			
EIA Summary	• Summary of alternatives considered in terms of siting, technology selection/operation processes and design • Concise integrated summary of the main impacts and residual effects after applying mitigation • Risks and uncertainties relating to the findings and implications for decision making			
1. Project Description Include as an introduction, basic information about the project and project proponent				
1.1 Project Location and Area	a) Map showing sitio, barangay, municipality, province, region boundaries, vicinity, proposed buffers surrounding the area and Primary & secondary impact areas			
	b) Geographic coordinates (shape file data) of project area (use WGS 84 datum - GPS setting)			
	c. Describe the vicinity and the accessibility of the project site/area			
1.2. Project Rationale	• Cite and focus on the need for the project based on national and regional/local economic development in terms of contribution to sustainable development agenda or current development thrusts. • Describe the justification for the Project with particular reference made to the economic and social benefits, including employment and associate economic development, which the project may provide. The status of the project should be discussed in a regional and national context.			
1.3. Project Alternatives	a) Cite criteria used in determining options for facility siting, development design, process/technology selection, resource utilization and discuss how the decisions on the preferred options were made. Siting: Alternative project locations including factors significant to the selection such as severity of impacts, perception of affected communities with regards to project, ancestral domain issues, land classification, etc. Discuss other options on the siting of major components of the project within the project area. Technology Selection/Operation Processes and design Selection for storage: Alternative technologies, operation processes, and measures to minimize wastes, prevent adverse impacts such as air and water pollution, groundwater and land contamination, and for the prevention/control of emergency events (eg. fire, explosion, leaks, spills) including factors significant to the selection. Resources: Alternative sources of power, water, raw materials and other resources needed including factors significant to the selection such as supply sustainability and climate change projections			

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

☐ 1st ☐2nd ☐3rd ___ th Screening

Sections / Subsections	Content	Page #	Acceptable?	REMARKS
	Likewise contextualize the determination of preliminary options in terms of project site factors significant to the selection such as supply sustainability and susceptibility to: • *Liquefaction, Ground Shaking, Ground Rupture, Earthquake induced Landslides Volcanic eruptions, tsunami (PHIVOLCS)* • *Rain-induced landslide and flooding (MGB)* • *Storm surge, and flooding as well as extreme climatologic conditions (PAGASA)*			
	b) Summarize and discuss comparison of environmental impacts of each alternative for facility siting, development design, process/technology selection, resource utilization			
	c) Discuss the consequences of not proceeding with the project or no project option			
1.4 Project Components	a) General layout of facilities;			
	b) Maps showing in particular, the location and boundaries of project area, location and footprint of main facilities, storage and support facilities, and proposed buffers. ***Indicative site development plan to state the usage/ purpose of the area, including buffer zone, mini-park development, road side tree planting or conceptual development plan and land use plan including site of identified sources at appropriate scale indicating relative distance to project***			
	c) Identification and general description of major components such as materials, capacity, number, safety features , etc			
	d) Identification and description of support facilities and infrastructure requirements such as energy/power generating facility (if any) or energy source, water supply/storage, storm water drainage, sewerage, telecommunications, safety devices/emergency facilities, accommodation and similar facilities			
	e)Identification and description of pollution control devices and waste management system for the waste materials: wastewater, air emissions, domestic wastes, toxic and hazardous wastes, non toxic and non hazardous wastes, etc.			
1.5. Process/ Technology	a) Description of the Processing/Manufacturing technology ○ process flow sheet showing material, and water (and energy, if applicable) balance including inputs and similar data on products, recycling and waste streams ○ materials/product handling and transport including storage protocols			
	b) Description of the pollution control devices and waste management system			
	c) Description of the operations and maintenance of facility			

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

☐ 1st ☐2nd ☐3rd ___th Screening

Sections / Subsections	Content	Page #	Acceptable?	REMARKS
I.6. Project Size	a) Total capacity / stock population/dimension (whichever is applicable based on screening parameter in the Guidelines for Coverage Screening per MC 2014-005)			
	b)Total Project Area in sq.m. or hectares			
I.7. Development Plan, Description of Project Phases and Corresponding Timeframes	Phases to be described in terms identifying specific activities (w/ special attention on those with significant environmental impacts as well as climate change adaptation options relevant to the project and project activities) and corresponding projected implementation timeframes: • ***Pre-construction*** (e.g. planning, acquisition of rights to use land, etc.) • ***Construction*** (e.g. land/site clearing, temporary housing, transport of materials, health and other services for the workforce, discussion of temporary facilities including the progress of works/milestones and the number workers required per milestones) ***Proposed timetable – land development and other related activities*** • ***Operation*** (projected period of start-up/commissioning/full operation of various project components) include discussion on the operation of various components (as identified above) in terms of raw materials, fuel requirements, waste management and infrastructure requirements • ***Decommissioning/Abandonment/Rehabilitation*** - projected life of the project and alternatives for the future use of the project area which should be consistent with long term zoning and land use development plan of the municipality; - Abandonment Plan (general) to include management plan for the projected cumulative/long term project impacts such as remediation of contaminated soil and water resources, land restoration, proper dismantling/abandonment of facilities/ equipment and other necessary activities			
I.8. Manpower	Tabulate the following per project phase (pre-construction, construction, operation and maintenance): • manpower requirements; • expertise/skills needed; • nature & estimated number of jobs available for men, women, and indigenous peoples (if in IP ancestral land); • scheme for sourcing locally from host and neighboring LGUs			
I.9. Project Cost	Indicative Project Investment Cost (Philippine Peso) • ***Estimated cost of land development including supporting data (i.e., existing labor force, structure, and average cost and available equipment and average cost/ rental rates)*** • ***Proposed funding/ financing of the project***			
2. Assessment of Environmental Impacts See Table 3 for the list of key environmental impacts which shall be subjected to assessment. The assessment shall done using the prescribed				

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

☐ 1st ☐2nd ☐3rd ___ th Screening

Sections / Subsections	Content	Page #	Acceptable?	REMARKS
	approach/method and in relation to the corresponding baseline characterization in the primary and secondary impact areas (*as determined using the Guidelines in Annex 2-2 of the Revised Procedural Manual (RPM) for DAO 2003-30 or succeeding issuances*). The sampling and measurement plan used shall be discussed. Likewise, the assessment should be done for the various phases of development (i.e. pre-construction, construction and operation) and should consider climate change projections and disaster risks based on existing natural hazard information. For all maps, include overlays of project area footprint, show sensitive/critical receptors and sampling points for baseline data (indicate geographical coordinates). In conclusion, the residual and cumulative impacts shall be assessed.			
3. Environmental Management Plan	Appropriate mitigation/management measures should be specified for each of the identified key impacts (Table 3). Appropriate climate change adaptation and disaster risk reduction measures/options shall likewise be thoroughly discussed. The impact management plan should be summarized using at the minimum, the format in Annex 2-17 of RPM for DAO 2003-30			
4. Environmental Risk Assessment (ERA) & Emergency Response Policy and Guidelines	The level of coverage and type of document required shall first be determined based on Annex 2-7e of RPM for DAO 2003-30. See Table 4 for details			
5. Social Development Plan/Framework (SDP) and IEC Framework				
5.1 Social Development Program (SDP)	Community development or livelihood programs/activities, projected beneficiaries, partner institutions, timeframe of implementation as well as source and amount allotted per activity/component (See Annex 2-18 of RPM for DAO 2003-30)			
5.2. Information and Education Campaign (IEC)	Target sector, key messages, scheme/strategy/methods, Information medium, timelines and frequency, cost (See Annex 2-19 of RPM for DAO 2003-30)			
6. Environmental Compliance Monitoring				
6.1 Environmental Performance N/A	• Results of compliance monitoring in matrix and graphical form showing and explaining the trend in environmental conditions • Analyze performance based on the Environmental Quality Performance Levels (EQPLs) set • Discuss compliance to ECC conditions and performance against the originally approved Environmental Management and Monitoring Plan, MMT requirements/commitments, third party audits (if any) • Discuss implementation of appropriate and effective environmental impact remedial actions in case of exceedances • Discuss operationalization of complaints management system			

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

☐ 1st ☐2nd ☐3rd ___th Screening

Sections / Subsections	Content	Page #	Acceptable?	REMARKS
6.2 Self-Monitoring Plan	The monitoring plan shall be summarized using Annex 2-20 of RPM for DAO 2003-30 or succeeding issuances as template.			
6.3. Multi-Sectoral Monitoring Framework	Discussion on the necessity of creating a Multi-Partite Monitoring Team (MMT). If deemed necessary, describe the proposed scope of MMT responsibilities and activities and tabulate the list of proposed stakeholder-members of the MMT, basis of selection and proposed role. (See Annex 3-4 of the RPM for DAO 2017-15 & 2018-18).			
6.4 Environmental Guarantee and Monitoring Fund Commitments	*Discussion on the necessity of putting up an EGF. If deemed necessary, present a proposed amount of EGF indicating the basis for the estimate (per guidelines in annex 3-6 of RPM for DAO 2003-30) *If MMT is deemed necessary, present a proposed amount of EMF (based on a draft AWFP in following the format in Annex 3-4 and consistent with guidelines in for DAO 2017-15);			
7. Decommissioning / Abandonment /Rehabilitation Policy Statement on Proponent's policies to implement the abandonment plan described in Item 1.7 and to formulate and submit procedures for Rehabilitation/ Decommissioning/Abandonment within a timeframe specified in the ECC.				
8. Institutional Plan for EMP Implementation Present the organizational scheme of the proponent including line of command and reporting procedures as well as manpower complement and relationships with other operating departments.				

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

Table 3. Key Environmental Impacts to be included in the Assessment and Formulation of Management and Monitoring Plan to be reflected in the EIS/EPRMP

During scoping: Unless otherwise specified as agreed during scoping, all items listed are required. Write specific instructions (if any) on the blanks/spaces provided

✓ *For completeness during procedural screening, page numbers should be provided upon submission of the EIS/EPRMP*

List of Key Impacts	Baseline Data Parameter Requirements	Required Assessment Methodology/Approach	Baseline Conditions		Impact Analysis		Mgmt. Plan		Monitoring Plan		Remarks
			Page	✓	Page	✓	Page	✓	Page	✓	
1. Land											
1.1. Land Use and Classification											
1.1.1 Impact in terms of compatibility with existing land use	Description & Map showing the project area in relation to existing land use.	Assessment of the compatibility of the proposed project vis-a-vis actual land use and the approved comprehensive land use plan/zoning classification, ECA Classification and/or the coastal resource management plan of the LGU if any.									
1.1.2 Impact on compatibility with classification as an Environmentally Critical Area (ECA)	Identify ECA where the project is located or near the project area. Identify areas vulnerable/susceptible to natural hazards where the project is located or near the project area (include map/s).										
1.1.3 Impact in existing land tenure issue/s	Determine if the project area is under CARP or with CADC / CADT / CALC/ CALT; with IFMA/CBFMA, within COC, within MPSA or other tenurial instruments and identify corresponding existing tenure issues including presence of informal settlers.	Identify and assess impact in terms of land tenure issues in relation to project implementation									
1.1.4 Impairment of visual aesthetics	Visually significant landforms/ landscape/structures	Identify and assess impact of the project on these visually significant landforms/landscape/structures									
1.1.5 Devaluation of land value as a result of improper solid waste management and other related impacts	Existing solid waste management and related land management scheme in the area	Identify and assess impacts of the estimated generation of solid wastes in terms of: - amount and - characteristics (hazardous or domestic) and other related issues on the existing management scheme									
1.2 Geology/Geomorphology											

Project Name: _____

GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

During scoping: Unless otherwise specified as agreed during scoping, all items listed are required. Write specific instructions (if any) on the blanks/spaces provided

✓ *For completeness during procedural screening, page numbers should be provided upon submission of the EIS/EPRMP*

List of Key Impacts	Baseline Data Parameter Requirements	Required Assessment Methodology/Approach	Baseline Conditions		Impact Analysis		Mgmt. Plan		Monitoring Plan		Remarks
			Page	✓	Page	✓	Page	✓	Page	✓	
1.2.1 Change in surface landform/geomorphology/ topography/ terrain/slope	Slope and Elevation/Topographic Map	Identify and assess project impact in terms of the changes in surface landform/topography/terrain/slope including existing hazard as maybe aggravated by climate change as projected by PAGASA									
1.2.2 Change in sub-surface geology/underground conditions	Regional/General Geological Map Natural Hazard Map (sub surface)	Identify and assess project impact in terms of the changes in sub-surface geology and inducement of subsidence, liquefaction, landslides, mud/debris flow to the environment including the possibility of aggravating existing natural hazards Discuss and assess the impacts of geologic hazards and planned earthworks on the project facilities (e.g., landslides, mudflows, subsidence, ground shaking from earthquake, liquefaction, flooding, etc.). Note in the discussion how climate change can aggravate the hazards and impacts. The geologic hazards map must consider the hazards/exposure/vulnerability/ risk maps of Section 1.1.2									
1.2.3 Inducement of subsidence, liquefaction, landslides, mud / debris flow, etc.	Geological Map as needed.; hazard maps (NAMRIA, NDRRMC, MGB, PHIVOLCS, PAGASA) Include geotech report with evaluation (soft copy)										
1.3 Pedology N/A											
1.3.1 Soil erosion / Loss of topsoil/overburden	• Summary of Soil Investigation Report on soil type and quality • Soil map showing soil types, sampling stations, topography, streams, built-up areas, and planned project features • Water and wind erodibility potential • Sediment sources, and • Riverbank stability	Describe capability of the land to accommodate the proposed development with minimal or without soil erosion/loss of topsoil/overburden Describe the physical properties and erodibility potential of the soil, ongoing erosion processes and									

Project Name: _____

GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

During scoping: Unless otherwise specified as agreed during scoping, all items listed are required. Write specific instructions (if any) on the blanks/spaces provided

✓ *For completeness during procedural screening, page numbers should be provided upon submission of the EIS/EPRMP*

List of Key Impacts	Baseline Data Parameter Requirements	Required Assessment Methodology/Approach	Baseline Conditions		Impact Analysis		Mgmt. Plan		Monitoring Plan		Remarks
			Page	✓	Page	✓	Page	✓	Page	✓	
		assess the erosional impacts of the project. The Universal Soil Loss Equation (USLE) and its variants may be used in the modeling.									
1.3.2 Change in soil quality/fertility	Laboratory results on soil sample analysis for N, P, K, pH, organic matter, micronutrients and trace metals e. g Pb, Hg, As, Cd, Cr hexavalent, etc.	Assess the impact of the project activities including the possibility of spills on soil quality and fertility									
1.4 Terrestrial Ecology											
1.4.1 Vegetation removal and loss of habitat	• Map showing land cover, sampling sites; location of observed important, endangered, and keystone species, ecologically sensitive sites, planned land development works • Flora and fauna species inventory or survey report to cover species listing, abundance, richness, dominance, diversity, evenness, ecological status, and uses; • Historical occurrences of pest infestation, forest/grass fire and/or similar incidences	To establish baseline, - Use quadrat sampling for flora to cover all land cover types - Use transect walk – mist nets, traps, for fauna - show survey locations in a map Identify and assess specific impacts of the project activities guided by the following: 1. Habitat loss or degradation – Land clearing, river damming, etc. will result in the loss of habitat. Some activities may lead to the alteration of habitat composition, structure or function. Some habitats, e.g. wetlands, are critical to ecological processes or endangered species. 2. Habitat fragmentation – This is the break-up of the natural landscape into small patches isolated from one another. It affects the number of species present, movement of species, and transfer of materials among habitats. 3. Loss of species – Of special									
1.4.2 Threat to existence and/or loss of important local species (if applicable)	Summary of endemicity / conservation status										
1.4.3Threat to abundance, frequency and distribution of important species (if applicable)	• Summary of abundance, frequency and distribution • Economic importance and uses of significant flora and fauna										
1.4.4 Hindrance to wildlife access (if applicable)	Survey map in relation to the project site										

Project Name: _____

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

During scoping: Unless otherwise specified as agreed during scoping, all items listed are required. Write specific instructions (if any) on the blanks/spaces provided

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List of Key Impacts	Baseline Data Parameter Requirements	Required Assessment Methodology/Approach	Baseline Conditions		Impact Analysis		Mgmt. Plan		Monitoring Plan		Remarks
			Page	✓	Page	✓	Page	✓	Page	✓	
		interest are the keystone, endangered, and endemic species. 4. Pollution effects on species – The stressors include dust, noise,chemical/ petrochemical spills, eroded sediment, increased temperature, etc. Relate discussions to estimated GHG emissions and possible carbon sequestration programs									
2. THE WATER											
2.1 Hydrology/Hydrogeology											
2.1.1 Change in drainage morphology / inducement of flooding/ Reduction in stream volumetric flow	Drainage map (also showing local drainage system/infrastructures); Historical flooding/drought occurrences; stream flow measurements/estimates; Delineation of watershed /sub-watersheds/ floodplain; and identification of aquifers if any	Identify and assess project impact on the change in drainage morphology/local drainage system and resulting effects of flooding pattern in the project area and surrounding. Include climate projections effects on flooding Relate discussions to item 3.1.1									
2.1.2 Change in stream, lake water depth	Regional hydrogeological map	Identify and assess project impact in terms of change in stream, lake water depth (if applicable)									
2.1.3 Depletion of water resources / competition in water use	Current / projected water use (groundwater/surface water) in the area and adjacent areas Inventory of water supply source including springs and wells(indicate depth of water table) and show location in a map of appropriate scale	Identify and assess project impact on the existing water resources and the resulting competition in the water use using analysis/estimation of water availability. Include discussions taking into consideration the PAGASA medium to long term projections									

Project Name: _____

GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

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			Page	✓	Page	✓	Page	✓	Page	✓	
2.2 Oceanography (not applicable) *applicable to projects with jetty/port and/or subsea structures that will change the bathymetry in the area*											
2.2.1 Change/disruption in water circulation pattern, littoral current, and coastal erosion and deposition	• Bathymetric survey and map • Measurement of water currents • Analysis of available proximate tides data • Hydrodynamic modeling • Particle dispersion modeling and map • Storm surge hazard, exposure, vulnerability, risk maps	Identify and assess project impact on the degree of change/disruption of circulation pattern and the potential for coastal erosion Build a hydrodynamic model based on the measured bathymetry and currents and tidal analysis and then validate the model. A public domain software like the United States Environmental Protection Agency Environmental Fluid Dynamics Code (EFDC) may be used. Through the validated hydrodynamic model, assess the impacts of the project on water circulation, littoral current, and coastal erosion and deposition. Use the modeling results of Sec. 1.3.1 and 2.1.1. Discuss how the impacts may be affected by climate change especially sea level rise.									
2.2.2 Change in bathymetry	Bathymetric map;	USLE / similar modeling when applicable Use the hydrodynamic model to assess the impacts of the bathymetric changes. Discuss how the impacts may be affected by climate change. Compare projected new bathymetry as a result of the project with the existing									
2.3 Water Quality											

Project Name: _____

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

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List of Key Impacts	Baseline Data Parameter Requirements	Required Assessment Methodology/Approach	Baseline Conditions		Impact Analysis		Mgmt. Plan		Monitoring Plan		Remarks
			Page	✓	Page	✓	Page	✓	Page	✓	
2.3.1 degradation of groundwater quality	Physico-Chemical characterization of water (DAO 2016-08): ☐ pH ☐ BOD5 ☐ COD ☐ DO ☐ Oil and grease ☐ TSS ☐ Heavy Metals : ☐ _____ ☐ fecal / total coliform ☐ others: _____ ☑ sampling site map Miss Maricris Laciste for comments to follow	Identify and assess project impact in terms of degradation of groundwater, coastal surface water and coastal/marine water quality. Use DENR standard methods and procedures for sampling and analysis.									
2.3.2 degradation of surface water quality		Assess impact on siltation of surface and coastal/marine waters. Circulation / plume modeling for regular discharges, leaks/spills, worst case scenario of failure of WTF and other emergency/ accident scenarios for facilities with structures in water bodies									
2.3.3 degradation of coastal/marine water quality (not applicable)		Link discussion of spills with Section 1.3 especially if spills affect soil and groundwater. Aquifer (Groundwater) vulnerability Assessment (i.e. discussions on groundwater contamination due to project operation). Show in a map, sampling sites for monitoring purposes based on the above assessment.									
2.4 Freshwater Ecology (if applicable)											
2.4.1 Threat to existence and/or loss of species of important local and habitat	• Summary of endemicity / conservation status • Abundance of ecologically and economically important species (fishes, benthos, planktons);	Identify and assess project impact in terms of threats to existence/and or loss of species, abundance frequency and distribution species and include discussions on overall									

Project Name: _____

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

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List of Key Impacts	Baseline Data Parameter Requirements	Required Assessment Methodology/Approach	Baseline Conditions		Impact Analysis		Mgmt. Plan		Monitoring Plan		Remarks
			Page	✓	Page	✓	Page	✓	Page	✓	
2.4.2 Threat to abundance, frequency and distribution of species	• Presence of pollution indicator species; • sampling site map	Impact to freshwater ecology: Relate discussions to air and water Show in a map, sampling sites for monitoring purposes based on the most significant threats identified.									
2.5 Marine Ecology (not applicable) *(applicable if project involves activities, discharges and structure in marine waters)*											
2.5.1 Threat to existence and/or loss of important local species and habitat	• Abundance/densities/distribution of ecologically and economically important species (mangroves, fishes, benthos, planktons, coral reefs, algae, seaweeds, sea grasses);	Quadrat, transect, line intercept, spot dive, manta tow, marine resource characterization (e.g. municipal and commercial fisheries data) for baseline gathering									
2.5.2 Threat to abundance, frequency and distribution	• Presence of pollution indicator species; • Historical occurrences of red-tide, fish kill or any related event • marine resource map • sampling site map	Identify and assess project impact in terms of threats to existence, loss of important local species, threat to abundance, frequency and distribution and include discussions on overall impact to marine ecology. Relate discussions to air, water and oceanography Show in a map, sampling sites for monitoring purposes based on the most significant threats identified.									
3.0 THE AIR											
3.1 Meteorology/Climatology											
3.1.1 Change in the local micro-climate e.g. local temperature	Monthly average rainfall and temperature of the area; Climatological normals/extremes; Wind rose diagrams, Frequency of Tropical cyclones	Identify and assess project impact in terms of change in the local micro-climate change. Also discuss effects of climate change using PAGASA medium to long term projections									

Project Name: _____

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

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List of Key Impacts	Baseline Data Parameter Requirements	Required Assessment Methodology/Approach	Baseline Conditions		Impact Analysis		Mgmt. Plan		Monitoring Plan		Remarks
			Page	✓	Page	✓	Page	✓	Page	✓	
3.1.2 Contribution in terms of greenhouse gas emissions (or GHG mitigation potential) Note: applicable only for projects with significant GHG emissions	Data on Greenhouse gasses (i.e. carbon dioxide, nitrous oxide);	Estimate projected greenhouse gases (GHG) (i.e. carbon dioxide, nitrous oxide) using IPCC guidelines; include mitigation and/or sequestration for both construction and operation phases.									
3.2 Air Quality (& Noise)											
3.2.1 Degradation of air quality	Characterization of ambient air quality: X TSP X PM10 X PM2.5 ☐ Trace Metals: _____ ☐ others: _____ (for sampling methods refer to Clean Air Act) ☑ sampling site map	Use DENR standard methods and procedures for sampling and analysis. Relate selection of sampling locations using data collected in 3.1.1 Identification and assessment of impact of the project to the identified parameters including VOCs and odor through air dispersion modeling (as may be applicable) Show in a map, sampling sites for monitoring purposes based on the above assessment. *Compare changes in air quality over time using statistical tools e.g. across sampling sites over time, and test for significant changes*									

Project Name: _____

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

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List of Key Impacts	Baseline Data Parameter Requirements	Required Assessment Methodology/Approach	Baseline Conditions		Impact Analysis		Mgmt. Plan		Monitoring Plan		Remarks
			Page	✓	Page	✓	Page	✓	Page	✓	
3.2.2 Increase in ambient noise level	Characterization of ambient noise level X sampling site map	Use DENR standard methods and procedures for sampling and measurement. Identification and assessment of impact to ambient noise level using noise attenuation modeling and comparing it with relevant standards (applicable if estimated total noise level will exceed noise standard).									
4.0 THE PEOPLE											
4.1 Displacement of settler/s Displacement / disturbance of properties Change/conflict in land ownership Change/conflict Right of way Impact on Public Access	Demographic data of impact area: - Number of households and household size - Land area, - Population, - Population density /growth - gender and age profile, - literacy rate, profile of educational attainment - settlements map Census of population / property that will be displaced / disturbed Housing ownership profile / availability of housing/ number of informal settlers	Identify and assess project impacts on demography of affected communities. Use assessment in the formulation of SDP/IEC Assess availability of alternative public access and housing options for displaced settlers For project with displacement/ disturbance of properties/settlers, change/conflict in land ownership and change/conflict right of way, formulate resettlement framework plan or RAP 1. Include a perception survey that will cover the population that will be affected by the project (potentially displaced). 2. Discuss the methodology that will be used in the conduct of the perception survey as well as the statistical formula that will be used in determining the sample size for the survey. 3. Include a discussion of the									

Project Name: _____

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			Page	✓	Page	✓	Page	✓	Page	✓	
		LARAP that will be adopted.									
4.2 In-migration proliferation of informal settlers		Identify and assess project impact due to in-migration patterns including proliferation of informal settlers									
4.3 Cultural/Lifestyle change (especially on Indigenous People, if any)	Demographic data on Indigenous People (if any) and existing Culture/Lifestyle that may be significantly affected	Identify and assess project impact in terms of Culture/Lifestyle that may be affected and/or introduced									
4.4 Impacts on physical cultural resources	Inventory and description of physical cultural resources and landscapes that have archaeologic, paleontologic, historical, religious, aesthetic, or cultural significance. Movable or immovable objects, below ground or under water, sites, structures, groups of structures, and natural features Classify cultural interest value/ importance into local, provincial, national, or international level *Sources of information: UNESCO, National Museum (NM), National Historical Commission of the Philippines (NHCP), National Commission for Culture and Arts (NCAA) and the Local Government Units (LGUs) in the project area and other UN or National Publications*	Identify all potential project impacts in an integrated manner considering the type, significance, and value/importance of the physical cultural resources/s Identify risks in terms of capacity and commitment in managing the impacts *(protocols in handling chance finds shall be implemented)*									
4.5 Threat to delivery of basic services /resource competition	Availability of public services in terms of: • Water supply • Power supply	Identify and assess project impact in terms of threats to delivery of basic services including potential for resource competition in the area including effects of in-migration									

Project Name: _____

GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

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			Page	✓	Page	✓	Page	✓	Page	✓	
	• Communications /transportation • peace and order / crime • education facilities • recreational facilities / sports facilities statistical data / information related to public services: • literacy rate, profile of educational attainment • Crime rate • Food security										
4.6 Threat to public health and safety	Availability of public services in terms of health resources (Government and Private) Statistical data / information related to public services: • Morbidity and mortality rates (infants and adults - 5-year trend) • Common diseases in the area including endemic diseases; Environmental Health and Sanitation Profile	Identify and assess specific threats to public health and safety due to project impacts. Relate discussions to land, air and water (Item 1 to 3) Analysis of the impact of project implementation on existing disease profile including weather sensitive diseases and impact aggravation as a result of climate change as projected by PAGASA									
4.7 Generation of Local Benefits from the project Enhancement of employment and livelihood opportunities Increased business opportunities and associated economic activities	Socioeconomic data: • Main sources of Income • Employment rate/ profile • Poverty incidence • sources of livelihood • commercial establishments and activities • banking and financial institutions	Identify and assess local benefits of the project in terms of enhancement of employment and livelihood opportunities, increased business opportunities and associated economic activities and increased revenue of LGU									

Project Name: _____

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GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

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List of Key Impacts	Baseline Data Parameter Requirements	Required Assessment Methodology/Approach	Baseline Conditions		Impact Analysis		Mgmt. Plan		Monitoring Plan		Remarks
			Page	✓	Page	✓	Page	✓	Page	✓	
Increased revenue of LGUs											
4.8 Traffic congestion	Road network/ systems Existing Transportation/traffic situation	Identify and assess project impact on the traffic situation in the area including congestion based on existing capacity of road system									

Table 4. Environmental Risk Assessment to be included in EIS/EPRMP

During scoping: Check (✓) required/applicable items; items with ✓ are automatically required; write specific instructions (if any) on the blanks/spaces provided

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Level of Coverage & Type of Risks	CONTENTS OF ERA AS PART OF EIS/EPRMP For the identified safety risks in column 1	Remarks/ Specific Scoping Instruction/s	ERA		ERP		Monitoring Plan		REMARKS
			Page	✓	Page	✓	Page	✓	
Level of Coverage: Refer to Annex 2-7e of the RPM for DAO 2003-30 ☐ Level 2 (QRA Required) X Level1 (Emergency Plan based on hazard analysis) ☐ Risk Screening Level	For EIS, check type of report to be submitted prior to Operation: ☐ Quantitative Risk Assessment(QRA) ☐ HAZOP ☐ Others : _____								
Safety Risks Type: X Fire X Explosion ☐ Release of toxic substances	☑ Description of conditions, events and circumstances which could be significant in bringing about identified safety risks ☑ Description & assessment of the possible accident scenarios posing risk to the environment								

Project Name: _____

GENERIC EIS/EPRMPSCOPING AND SCREENING FORM

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Level of Coverage & Type of Risks	**CONTENTS OF ERA AS PART OF EIS/EPRMP For the identified safety risks in column 1**	Remarks/ Specific Scoping	ERA	ERP	Monitoring Plan	REMARKS
	Description of the hazards, both immediate (acute effects) and delayed (chronic effects) for man and the environment posed by the release of toxic substance, as applicable ☑ The safety policy and emergency preparedness guidelines consistent with the regulatory requirements. Emergency Preparedness should also consider natural hazards to the infrastructures and facilities.					
X Physical Risks (Failure of Structure w/c could endanger life, property and/or the environment)	☑ Description of conditions, events and "trigger" which could be significant in bringing about identified physical risks ☑ Description & assessment of the possible accident scenarios posing risk to the environment ☑ Description of the hazards both immediate (acute effects) and delayed (chronic effects) for man and the environment posed by the failure of structure, as applicable					

Noted By:	Signature		Signature
Review Committee Members		EMB Representatives	
1. Dr. Ramon Quebral		1. Engr. Regina Paula Eugenio	
2. Engr. Jundy de Socorro		2. Engr. George Silvederio	
3.		3. Engr. Mary Therese Gonzales	
Resource Person		Project Proponent:	
1. Mr. Jhonel S. Siarez		Engr. Tony Tan	
2. Mr. Inocencio Jesus Ramos		Project Preparer/Consultant:	
3. Ms. Joanna May M. Macaranas		Mr. Alvin F. Nacu	

☐ 1st ☐ 2nd ☐ 3rd — In Screen

Project Name: _____

Project Description for Technical Scoping
LRT Line 6-A and Line-6B+C Project
March 8, 2019
THE AIR MODULE

The Air	Comments
Baseline Air Quality	Conduct 1hr and 24 hour monitoring *(per NAAQGV & NAAQSSSAP under RA9849)* in strategic monitoring station based on upwind and down wind directions, Area Sensitive Receptors (especially Residential) for the LRT stretch covering Paaranque, Bacoor, Damariñas, Las Piñas, Muntinlupa for the following parameters: TSP,PM10,PM2.5,NO2,SO2 Conduct 24 hr Baseline *(per Sec 78 Ambient Noise Qty Standards EQSNGA under Official Gazette PD984)* Noise Monitoring Geotag (UTM coordinates) monitoring stations in Maps such as Google Earth.
Construction Phase	As raised in Public Scoping, , Identify List of Construction and Transport equipment, other relative activities as Sources of Dust and Gaseous Emission based on Spatial construction schedule . Geotag areas of air pollution sources projected in Maps such as Google Earth. Eg. Diesel-fed Engine in Backhoe, Crane, Dozer, storage piles, Batching Plant, generatorsets, demolition etc. Conduct Emission Estimate for PM, CO, SO2, NO2 emission based on projected Activity Rates using USEPA,EMEP, NPI Emission Factors as agreed /approved by EMB. Provide mitigating measures in the IMP for Dust and Gaseous emission generation.
Construction and Operation	As raised in Public Scoping, Conduct noise Modeling and identify impacts areas and affected noise receptors. Provide noise Mitigating measures in the IMP. Also raised in public scoping, provide comprehensive discussion on projected noise level reduction advantage between overhead and underground railway. Conduct GHG estimates from all combustion, transport and sources using IPCC emission factors. Recommend mitigating measures and GHG sequestration program.
IMP and EMoP	Consistency on Identified impact and mitigating

Project Description for Technical Scoping
LRT Line 6-A and Line-6B+C Project
March 8, 2019
THE AIR MODULE

	measure in the IMP corresponding to the appropriate air quality/emission parameter , frequency 7 EQPL in the EMoP

APPENDIX 11. GEOLOGICAL SITE SCOPING REPORT

Republic of the Philippines
Department of Environment and Natural Resources
MINES AND GEOSCIENCES BUREAU
Regional Office No. IV (CALABARZON)
8TH Floor, DENR by the Bay Bldg, Roxas Boulevard
Ermita, Manila, Philippines
Telefax. No. (+632) 310-88-97 **E-mail:** mgbcalabarzon@gmail.com
Website: region4a.mgb.gov.ph

Certificate No. 66832
EAC Code: 36

May 17, 2019

MR. ALVIN F. NACU
President
Seastems, Inc.
Room 314 Philippine Social Center Building,
Commonwealth Avenue, Diliman, Quezon City

Dear Mr. Nacu,

We are pleased to transmit to you herewith copy of the report entitled **"GEOLOGICAL SITE SCOPING REPORT ON THE LIGHT RAIL TRANSIT (LRT) 6 PROJECT COVERING PARAÑAQUE, LAS PIÑAS AND MUNTINLUPA CITIES, METRO MANILA, BACOOR AND DASMARIÑAS CITIES, CAVITE"** prepared by technical personnel of this office. The survey was undertaken last April 29-30, 2019 and was paid under Official Receipt No. 6702898 U dated April 22, 2019.

The GSSR contains the scope of identified geological issues and geohazards that needs to be addressed in the corresponding Engineering Geological and Geohazard Assessment Report (EGGAR) to be submitted to this office for appropriate review pursuant to DENR Administrative Order No. 2000-28 and MGB Memorandum Circular No. 2000-33

Please be reminded that upon submission of the corresponding EGGAR and prior to official review by this office, a review fee of Php 9,000.00 should be paid to our Cashier's Office.

Should you have any queries with regard to this matter, please contact our Office at telephone numbers 310-8781 and 310-8897.

Very truly yours,

By Authority of the Regional Director;

SOCORRO P. HERNANDEZ
OIC, Office of the Regional Director

Department of Environment and Natural Resources
Mines and Geosciences Bureau
Region IV-CALABARZON
Office of the Regional Director
051719-R04A-3969
2:24 PM LETTER 05/17/19

Republic of the Philippines
Department of Environment and Natural Resources
MINES AND GEOSCIENCES BUREAU
Regional Office No. IV (CALABARZON)
8TH Floor, DENR by the Bay Bldg, Roxas Boulevard
Ermita, Manila, Philippines
Telefax. No. (+632) 310-88-97 **E-mail:** mgbcalabarzon@gmail.com
Website: region4a.mgb.gov.ph

MEMORANDUM

FOR : **THE REGIONAL DIRECTOR**
This Office

FROM : **THE OFFICER-IN-CHARGE**
Geosciences Division

DATE : **MAY 17, 2019**

SUBJECT : **GEOLOGICAL SITE SCOPING REPORT ON THE LIGHT RAIL TRANSIT (LRT) 6 PROJECT COVERING PARAÑAQUE, LAS PIÑAS AND MUNTINLUPA CITIES, METRO MANILA, BACOOR AND DASMARIÑAS CITIES, CAVITE**

DOCUMENTS ATTACHED :

1. Copies of the above-mentioned report prepared by Perlito A. Angeles, Supervising Geologist; and

2. Transmittal Letter to:

   MR. ALVIN F. NACU
   President
   Seastems, Inc.
   Room 314 Philippine Social Center Building,
   Commonwealth Avenue, Diliman, Quezon City

ACTION REQUESTED : For your information and perusal.

PERLITO A. ANGELES

Republic of the Philippines
Department of Environment and Natural Resources
MINES AND GEOSCIENCES BUREAU
Regional Office No. IV (CALABARZON)
8TH Floor, DENR by the Bay Bldg, Roxas Boulevard
Ermita, Manila, Philippines
Telefax. No. (+632) 310-88-97 **E-mail:** mgbcalabarzon@gmail.com
Website: region4a.mgb.gov.ph

MEMORANDUM

FOR : **THE REGIONAL DIRECTOR**
This Office

THRU : **THE OFFICER-IN-CHARGE**
Geosciences Division

FROM : **PERLITO A. ANGELES**
Supervising Geologist

DATE : **MAY 17, 2019**

SUBJECT : **GEOLOGICAL SITE SCOPING REPORT ON THE LIGHT RAIL TRANSIT (LRT) 6 PROJECT COVERING PARAÑAQUE, LAS PIÑAS AND MUNTINLUPA CITIES, METRO MANILA, BACOOR AND DASMARIÑAS CITIES, CAVITE**

INTRODUCTION

The geological site scoping of the LRT 6 Project of Prime Asset Ventures, Inc. (PAVI) was undertaken by the undersigned last April 29-30, 2019. The said activity was requested by Mr. Alvin F. Nacu, President of Seastems, Inc. with an official fee of P6,000.00 (O.R. No. 6702898 U dated April 22, 2019). This geological scoping aims to identify the various possible natural and man-made hazards in the project site and vicinity. This report serves as one of the basis of the more detailed study to be done later in the form of the Engineering Geological and Geohazard Assessment Report (EGGAR).

Brief Project Description and Location

The above project involves the construction of LRT lines and is divided into following segments (See Fig.1):

Project 6A: This segment consists of 8 stations starting from Barangay Niog station in Bacoor City to Governor's station in Dasmariñas City. The 23.5-kilometer alignment will pass portions of Molino Boulevard, privately controlled properties and segments of Molino-Paliparan Road.

Project 6B: This line has 10 stations extending from NAIA Terminals 1 and 2 station to San Nicolas Station in Bacoor City. The 16-kilometer alignment will pass portion of Dr. A. Santos Avenue, A. Canaynay Avenue, CAA Road, Marcos Alvarez Avenue., M. Alvarez Extn, and Alabang Zapote Road and will also traverse private properties.

Project 6C: This segment will start from Sucat Station until Lakefront Station covering 7.7 kilometers and a total of 6 stations. Thiis line traverses Dr. A. Santos Avenue.

Alabang Zapote LRT Line: Covers 4 stations (5 kilometers) from Marcos Alvarez Station in Las Piñas City to Star Mall Station.

Topography and Drainage

The whole area that encompasses the project is characterized by significantly flat to rolling topography. It has a generally north-northwest gradient with the highest elevation registered at the southern-most station in Dasmariñas City.

The main river that drains near the project area is the Zapote River and its tributaries. This river follows the regional north-northwest gradient and ultimately drains to Manila Bay.

GENERAL GEOLOGY

Stratigraphy

Based on the published geologic map of MGB (Cavite City Quadrangle and San Pedro Quadrangle), the coastal areas covering Parañaque, Las Piñas and Bacoor on the northwest and the shore areas on the east covering Muntinglupa and Sucat are underlain by Quaternary Alluvium. The rest of the study area is underlain by tuff and tuffaceous sediments that belong to Guadalupe Formation (See Fig. 2). The most recent Quaternary Alluvium consists of unconsolidated clay, sand and gravel that are derived from the weathering of older pyroclastic rocks. The latter rocks of Pleistocene age abound in southern-most and central portions of the study area.

Structures

The nearest and most active earthquake generating structure that may affect the study area is the West Valley Fault. The southern trace of the said structure is mapped along the western edge of Laguna Lake and may have directly run along the eastern-most segments of Line 6C and Alabang-Zapote Line.

IDENTIFIED GEOHAZARDS

The following geohazards were identified in the course of ocular inspection conducted in the area:

Seismic Hazards or Fault Related Hazards

The study area is found prone to ground shaking or vibration that can be attributed to earthquake generator previously discussed.

Worldwide study indicates that the ground acceleration is greater in areas made up of unconsolidated or fill materials as in the case of segments 6B and 6C and less in localities underlain by bedrock such as the one traversed by the majority of 6A .

Predominance of fill materials as a result of past and current land developments renders the northern portion of the project site susceptible to settlement.

Hydrologic Hazards

Localized flooding resulting from combined heavy rain and defective drainage design may bring about flooding of local extent particularly in the vicinity or segments of Projects 6B and 6C.

CONCLUSIONS AND RECOMMENDATIONS

Based from the findings previously discussed, the proponent is enjoined to adapt the following mitigations or recommendations:

1. A certification from Philippine Institute of Volcanology and Seismology (PHIVOLCS) must be obtained to determine the official certified distance of the project site to the nearest active fault previously mentioned. The certified distance should be used for the Deterministic Seismic Hazard Analysis in addition to the Probabilistic Seismic Hazard Analysis that will be conducted in the area. In case the fault is found traversing across the segment of the line previously mentioned, the original plan should be partially modified with appropriate adjustment so that the 5-meter buffer zone set by PHIVOLCS is observed. This precautionary measure can prevent disaster due to ground rupture.

   Additional engineering measures like adaption of the most appropriate foundation design should be done for the project by taking into account the geotechnical evaluation that has to be done in the study area particularly along the alignment. This is to minimize or eliminate the destructive effects of seismic hazard such as ground shaking. Thus;

2. The proponent is enjoined to submit a thorough evaluation of the project site in the form of Engineering Geological and Geohazard Assessment Report (EGGAR) that is prepared and duly signed by a private geologist or equivalent to this Office. The EGGAR must contain the various geohazards stated above plus the ones that will be identified later as a result of the more detailed study. The report should include corresponding precautionary measures that will become part of Environmental Compliance Certificate (ECC) conditionalities; and

3. Lastly, the EGGAR must conform to the format stipulated in Memorandum Circular No. 2000-33 of MGB.

PERLITO A. ANGELES

"MINING SHALL BE PRO-PEOPLE AND PRO-ENVIRONMENT IN
SUSTAINING WEALTH CREATION AND IMPROVED QUALITY OF LIFE"

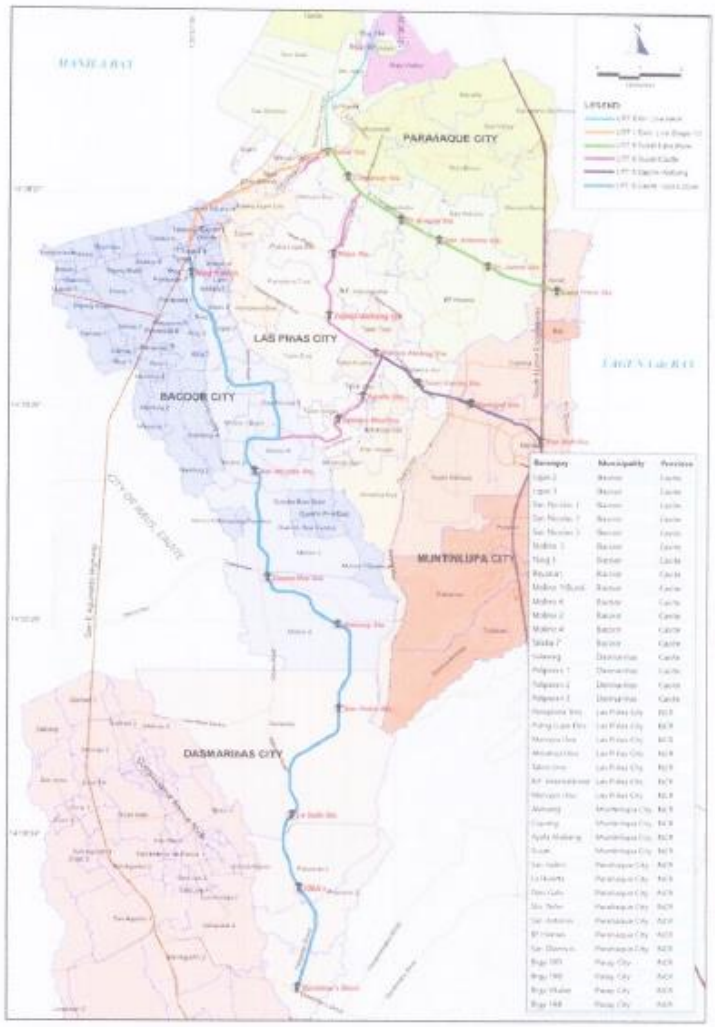

Fig. 1 Location Map of the Project Showing Exact Location (Seastems, 2018)

Fig. 2 General Geology comprising the study area (enclosed).

APPENDIX 12. PHIVOLCS CERTIFICATION

DOST
PHIVOLCS

Republic of the Philippines
Department of Science and Technology
PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY

Management System ISO 9001:2015

HASS-EQ-04

HAS-Jun-19-610

DATE 07 June 2019
FOR **SEASTEMS, INC.**
REPRESENTED BY **ALVIN F. NACU**
PURPOSE EGGAR permit requirement

EARTHQUAKE HAZARD ASSESSMENT

PROJECT NAME, LOCATION	GROUND RUPTURE	LIQUEFACTION	EARTHQUAKE-INDUCED LANDSLIDE	TSUNAMI
LRT Line 6A and Line 6B+C Project				
LRT Line-6A Stations (Name and Location)				
Niog, Brgy. Niog 3, Bacoor City, Cavite	**Safe; Approximately 9.5 kilometers west of the West Valley Fault (WVF)**	**Moderately susceptible**	**Safe**	**Prone; within the tsunami inundation zone**
Aguinaldo (Optional), Brgy. Niog 3, Bacoor City, Cavite	**Safe; Approximately 9.3 kilometers west of the WVF**	**Moderately susceptible**	**Safe**	**Prone; within the tsunami inundation zone**
Bacoor City Hall, Brgy. Niog 3, Bacoor City, Cavite	**Safe; Approximately 8.5 kilometers west of the WVF**	**Least susceptible**	**Safe**	**Safe**
San Nicolas, Brgy. Molino 2, Bacoor City, Cavite	**Safe; Approximately 7.1 kilometers west of the WVF**	**Safe**	**Safe**	**Safe**
Daang Hari, Brgy. Molino 4, Bacoor City, Cavite	**Safe; Approximately 6.4 kilometers west of the WVF**	**Safe**	**Safe**	**Safe**
Alabang, Brgy. Molino 4, Bacoor City, Cavite	**Safe; Approximately 4.4 kilometers west of the WVF**	**Safe**	**Safe**	**Safe**

PHIVOLCS Building, C.P. Garcia Avenue, U.P. Campus, Diliman, Quezon City 1101 Philippines
Tel. Nos.: (+632) 426-1468 to 79; (+632) 926-2611 | *Fax Nos.* (+632) 929-8366; (+632) 928-3757
Website: www.phivolcs.dost.gov.ph

San Pedro, Brgy. Salawag, Dasmariñas City, Cavite	Safe; Approximately 4.3 kilometers west of the WVF	Safe	Safe	Safe
La Salle, Brgy. Salawag, Dasmariñas City, Cavite	Safe; Approximately 4.7 kilometers west of the WVF	Safe	Safe	Safe
GMA, Brgy. Paliparan 3, Dasmariñas City, Cavite	Safe; Approximately 4.1 kilometers west of the WVF	Safe	Safe	Safe
Governor's Drive, Brgy. Paliparan 1, Dasmariñas City, Cavite	Safe; Approximately 4.4 kilometers west of the WVF	Safe	Safe	Safe
LRT Line-6B Stations (Name and Location)				
Sucat, Brgy. San Dionisio, Parañaque City, Metro Manila	Safe; Approximately 6.5 kilometers west of the WVF	Highly susceptible	Safe	Prone; within the tsunami inundation zone
Canaynay, Brgy. San Dionisio, Parañaque City, Metro Manila	Safe; Approximately 5.7 kilometers west of the WVF	Safe	Safe	Prone; within the tsunami inundation zone
Naga, Brgy. Pulang Lupa Dos, Las Piñas City, Metro Manila	Safe; Approximately 5.9 kilometers west of the WVF	Safe	Safe	Safe
Alabang - Zapote, Brgy. Pamplona Tres, Las Piñas City, Metro Manila	Safe; Approximately 5.8 kilometers west of the WVF	Safe	Safe	Safe
Marcos – Alvarez, Brgy. Talon Uno, Las Piñas City, Metro Manila	Safe; Approximately 4.6 kilometers west of the WVF	Safe	Safe	Safe
Apollo, Brgy. Talon Sinko, Las Piñas City, Metro Manila	Safe; Approximately 4.8 kilometers west of the WVF	Safe	Safe	Safe
Queen's Row, Brgy. Talon Uno, Las Piñas City, Metro Manila	Safe; Approximately 5.2 kilometers west of the WVF	Safe	Safe	Safe

San Nicolas, Brgy. Molino 2, Bacoor City, Cavite	Safe; Approximately 7.1 kilometers west of the WVF	Safe	Safe	Safe
LRT Line-6C Stations (Name and Location)				
Dr. A Santos-Sucat, Brgy. San Dionisio, Parañaque City, Metro Manila	Safe; Approximately 6.5 kilometers west of the WVF	Highly susceptible	Safe	Prone; within the tsunami inundation zone
Canaynay, Brgy. San Dionisio, Parañaque City, Metro Manila	Safe; Approximately 5.7 kilometers west of the WVF	Safe	Safe	Prone; within the tsunami inundation zone
El Grande, Brgy. San Isidro, Parañaque City, Metro Manila	Safe; Approximately 4.2 kilometers west of the WVF	Safe	Safe	Safe
San Antonio, Brgy. San Antonio, Parañaque City, Metro Manila	Safe; Approximately 3.2 kilometers west of the WVF	Safe	Safe	Safe
St. James, Brgy. San Antonio, Parañaque City, Metro Manila	Safe; Approximately 1.9 kilometers west of the WVF	Safe	Safe	Safe
Lake Front, Brgy. Sucat, Muntinlupa City, Metro Manila	Safe; Approximately 48 meters west of the WVF	Safe	Safe;	Safe
Alabang – Zapote LRT Line Stations (Name and Location)				
Marcos Alvarez, Brgy. Talon Uno, Las Piñas City, Metro Manila	Safe; Approximately 4.6 kilometers west of the WVF	Safe	Safe	Safe
Town Center, Brgy. Almanza Uno, Las Piñas City, Metro Manila	Safe; Approximately 3.4 kilometers west of the WVF	Safe	Safe	Safe
Madrigal, Brgy. Ayala Alabang, Muntinlupa City, Metro Manila	Safe; Approximately 2 kilometers west of the WVF	Safe	Safe	Safe

Star Mall, Brgy. Alabang, Muntinlupa City, Metro Manila	Safe; Approximately 99 meters west of the WVF	Safe	Safe	Safe
LRT Extension Line NAIA				
NAIA Terminal 1	Safe; Approximately 5.2 kilometers west of the WVF	Safe	Safe	Prone; within the tsunami inundation zone

EXPLANATION AND RECOMMENDATION

- ✓ All hazard assessments are based on the latest available hazard maps and on the location indicated by the vicinity map and coordinates provided.
- ✓ Ground rupture hazard assessment is the distance to the nearest known active fault. The recommended buffer zone, or Zone of Avoidance, against ground rupture hazard is at least 5 meters on both sides of the active fault or from its zone of deformation.
- ✓ All sites may be affected by strong ground shaking.
- ✓ Ground shaking and liquefaction hazards can be mitigated by following the provisions of the National Building Code and the Structural Code of the Philippines.
- ✓ Avoidance is recommended for sites with earthquake-induced landslide hazard unless appropriate engineering interventions are in place.
- ✓ Tsunami threat to people's lives can be addressed by community preparedness and tsunami evacuation plan. Advice for tsunami evacuation comes from public agencies and local governments. But more importantly, coastal communities must learn to evacuate themselves when they recognize the three natural signs of tsunami, namely 1) strong ground shaking, 2) unusual rise or fall of sea level, and 3) strong or unusual sound coming from the sea.
- ✓ This hazard assessment supersedes previous assessment made by this office regarding the site.

Assessed by Abigail C. Pidlaoan — Officer-of-the-Day
Verified by Maria Isabel T. Abigania and Kathleen L. Papiona — Senior Science Research Specialist

Approved by **BARTOLOME C. BAUTISTA** — **Deputy Director**
V2-2017-05-19

Appendix 13. List of Plants Recorded at the Project Site.

Appendix A. List of plant species recorded in the Study site and vicinity

Species	Common Name	Family	Habit
Acacia auriculiformis	Auri	Fabaceae	Tree
Acacia farnesiana	Aroma	Fabaceae	Tree
Acacia mangium	Mangium	Mimosaceae	Tree
Achyranthes aspera	Hangod	Acanthaceae	Herb
Amaranthus sp.	Uray	Amaranthaceae	Herb
Araceae sp.	Araceae sp	Araceae	Herb
Archantuophoenix alexandreia H. Wendl. & Drude	Queensland palm	Arecaceae	Palm
Areca cathechu L.	Bunga	Arecaceae	Palm
Azadirachta indica A. Juss.	Neem	Meliaceae	Tree
Bambusa spinosa	Kawayan tinik	Poaceae	Bamboo
Bauhinia sp.	Bauhinia vine	Facaceae	Vine
Bougainvillea spectabilis Willd.	Bougainvilla	Nyctaginaceae	Vine
Broussonetia luzonica	Himbabao	Moraceae	Tree
Carica papaya	Papaya	Caricaceae	Tree
Cassia spectabilis	Antsoan dilaw	Fabaceae	Tree
Ceiba pentandra	Kapok	Bombacaceae	Tree
Chromolaena odorata	Hagonoy	Asteracaceae	Herb
Cocos nucifera	Coconut	Arecaceae	Tree
Codiaeum variegatum cv.	San francisco	Euphorbiaceae	Shrub
Colocasia esculenta	Gabi	Araceae	Herb
Crescentia cujete L.	Calabash Tree	Bignoniaceae	Tree
Crinum asiaticum	Spider lily	Amaryllidaceae	Herb
Crinum asiaticum L.	Bakong Amazon lily	Amaryllidaceae	Herb
Delonix regia (Boj. Ex Hook.) Raf.	Fire Tree	Fabaceae	Tree
Diospyros discolor	Kamagong	Ebenaceae	Tree
Eleusine indica	Paragis	Poaceae	Grass
Eucalyptus deglupta	Eucalyptus	Verbenaceae	Tree
Eugenia sp.	Eugenia	Myrtaceae	Shrub
Ficus elastica	Ficus	Moraceae	Tree
Ficus nota (Blanco) Merr.	Tibig	Moraceae	Tree
Ficus religiosa	Ficus	Moraceae	Shrub
Ficus sp.	Balete	Moraceae	Tree
Ficus sp.	Ficus	Moraceae	Shrub
Gigantochloa levis (Blanco) Merr.	Bolo	Poaceae	Bamboo
Gliricidia sepium (Jacq.) Walp.	Kakauate	Fabaceae	Tree
Gmelina arborea	Gmelina	Verbenaceae	Tree
Hyptis suaveolens	Suag kabayo	Lamiaceae	Herb
Imperata cylindrica	Cogon	Poaceae	Grass
Ipomoea aquatica	Kangkong	Convolvulaceae	Herb
Jatropha curcas	Tubang bakod	Euphorbiaceae	Shrub
Lagerstroemia speciosa (L.) Pers.	Banaba	Lythraceae	Tree
Lantana camara	Lantana	Verbenaceae	Shrub
Leucaena leucocephala	Ipil-ipil	Fabaceae	Tree
Macaranga tanarius (L.) Muell.-Arg.	Binunga	Euphorbiaceae	Tree
Mangifera indica	Mangga	Anacardiaceae	Tree
Manihot esculenta	Cassava	Euphorbiaceae	Shrub
Manilkara sapota	Chico	Sapotaceae	Tree
Melanolepis multiglandulosa	Alim	Euphorbiaceae	Tree
Mikania cordata (Burm. F.) B.L. Rob.	Uoko	Asteraceae	Vine
Mimosa pudica	Makahiya	Mimosaceae	Herb
Moghania strobilifera	Payang payang	Fabaceae	Herb

Species	Common Name	Family	Habit
Moringa oleifera	Malunggai	Moringaceae	Tree
Muntingia calabura L	Datiles	Malvaceae	Tree
Musa sapientum	Banana	Musaceae	Tree
Nerium oleander	Nerium	Apocynaceae	Shrub
Paspalum conjugatum	Carabao grass	Poaceae	Grass
Phoenix dactylifera L.	Date palm	Arecaceae	Palm
Phragmites sp.	Reed	Poaceae	Grass
Pinus insularis	Pine tree	Pinaceae	Tree
Pithecellobium dulce	Kamachile	Fabaceae	Tree
Plumeria sp.	Kalachuchi	Apocynaceae	Tree
Polyalthia longifolia Benth. & Hook. F.	Indian lanutan	Annonaceae	Tree
Psidium guajava	Guava	Myrtaceae	Tree
Pterocapus indicus	Narra	Fabaceae	Tree
Ricinus communis	Castor oil plant	Euphorbiaceae	Shrub
Saccharum sp.	Sugar cane	Poaceae	Grass
Saccharum spontaneum	Talahib	Poaceae	Grass
Samanea saman	Rain tree	Fabaceae	Tree
Sandoricum koetjape	Santol	Meliaceae	Tree
Schefflera odorata	Galamay-amo	Araliaceae	Herb
Sida rhombifolia	Takling baka	Malvaceae	Herb
Sterculia foetida	Kalumpang	Sterculiaceae	Tree
Streblus asper	Kalios	Moraceae	Tree
Swietenia macrophylla	Mahogany	Meliaceae	Tree
Tamarindus indica	Sampalok	Fabaceae	Tree
Terminalia catappa L.	Talisai	Combretaceae	Tree
Trema orientalis (L.) Blume	Anabiong	Celtidaceae	Tree
Urena lobata	Mangkit	Malvaceae	Herb
Vitex parviflora	Molave	Verbenaceae	Tree
Zyziphus sp.	Zyziphus	Rhamnaceae	Tree

Appendix B. Photos of some of the vegetation and plant species in the study site and vicinity

	
Vegetated Island along Sucat Road	*Acacia auriculiformis* individual in SM Sucat
	
Trees along Canaynay (Sucat) – Cavite alignment	Coconut trees along Canaynay – Cavite alignment
	
Philippine endemic Himbabao along Canaynay-Cavite route	Fire trees and Bauhinia along VistaMall, Daang Hari
	
Individuals of Rain Tree near La Salle Station	Individual of Narra along Governor's Drive Station

Appendix C. Geographic coordinates of the survey points for the vegetation survey.

Date	Observation #	Location	°N Latitude	°E Longitude
March 2019	1	Alabang Sta.	14°22'27.71"N	120°59'44.99"E
	2	Alabang Sta.	14°22'12.91"N	121° 0'1.71"E
	3	Alabang Sta.	14°22'15.30"N	120°59'59.95"E
	4	San Pedro Sta.	14°21'12.36"N	120°59'50.95"E
	5	Dumpsite (between San Pedro Sta. and La Salle Sta.)	14°20'46.25"N	120°59'46.42"E
	6	La Salle Sta.	14°19'44.53"N	120°59'11.89"E
	7	Camella Lessandra (bet. Molino and San Nicolas Sta.)	14°25'30.37"N	120°58'48.19"E
	8	Camella Housing	14°25'37.24"N	120°58'51.11"E
	9	Loyola Mem'l Park	14°27'10.77"N	121° 2'13.59"E
	9a	Loyola Mem'l Park	14°27'17.37"N	121° 2'19.33"E
	10	Lake Front Sta.	14°27'11.00"N	121° 2'53.61"E
Oct. 2018	1	A. Santos Sta.	14°29'4.91"N	120°59'36.94"E
	2	Canaynay-Liana's Sta.	14°28'31.53"N	121° 0'3.90"E
	3	El Grande Sta.	14°28'7.47"N	121° 0'42.56"E
	4	San Antonio Sta.	14°27'54.21"N	121° 1'10.54"E
	5	St. James Sta.	14°27'31.81"N	121° 1'54.28"E
	6	Naga Sta.	14°27'38.10"N	120°59'41.74"E
	7	Zapote-Alabang Sta.	14°26'42.73"N	120°59'38.92"E
	8	M. Malvar Sta,	14°26'10.91"N	121° 0'23.41"E
	9	Apollo Sta.	14°25'38.09"N	121° 0'8.96"E
	10	Greenhills Arcade	14°25'6.56"N	120°59'49.84"E
	11	Bridge Gaedenia Valley Subd.	14°24'16.08"N	120°58'49.19"E
	12	Molino cor. GSIS Road	14°24'21.22"N	120°58'39.70"E
	13	Daang Hari Sta.	14°23'8.89"N	120°58'41.80"E
	14	Camella Homes	14°22'46.85"N	120°59'18.80"E
	15	La Salle Sta. (alignment)	14°19'30.07"N	120°59'4.91"E
	16	Molino Road	14°19'37.19"N	120°59'15.52"E
	17	Molino Road/GMA Sta.	14°18'53.78"N	120°59'12.56"E
	18	Governor's Drive Sta.	14°17'16.18"N	120°59'17.60"E

Appendix 14. Laboratory Results of Water Quality Analysis.

CRL Environmental Corporation

15 May 2019

Seastems, Inc.
Rm. 314, Phil. Social Science Center, Commonwealth Ave.
Diliman, Quezon City

ATTN: **Mr. Alvin F. Nacu**

Project Name: LRT LINE - 6A & LINE B + C
Lab. Nos.: P00091304-01/03

Enclosed are the results for samples received by CRL Environmental Corporation and tested for the parameters in the enclosed chain of custody.

Our DENR Recognition with C. R. No. 023/2018, will expire on September 24, 2021.

Likewise, our DOH Accreditation with Accreditation No. 03-001-17-LW-2, is valid from January 01, 2017 until December 31, 2019.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,

MARIA CARMELA Q. CAPULE
Chief Operating Officer

■ **Sales Office:** Unit 609 Cityland 10 Tower 1 * 6815 H.V. dela Costa, Ayala Ave., North * Makati City, Philippines 1226
Tel: (632) 840-4071; (652) 817-5307 * Fax: (632) 816-0329 * E-mail: crl@crllabs.com * http://www.crllabs.com
■ **Laboratory:** Bldg. 2, Berthaphil Compound 1, Berthaphil Inc. Industrial Park, Jose Abad Santos Ave., CFZ Pampanga, Philippines
Tel: (6345) 599-3943 * (6345) 499-6529 * (632) 552-5100 * Fax: (6345) 599-3963

Results of Analyses

Seastems, Inc
Rm. 314, Phil. Social Science Center, Commonwealth Ave.
Diliman, Quezon City

PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2009-119C
PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2009-119C

SN: F00061508.002
Date Received: 04/04/2019
Lab No.:P00091304

Project Name: LRT LINE - 6A & LINE B + C
Attention: Mr. Alvin F. Nacu

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00091304-01			**DateSampled: 04-04-19 09:05**			
Sample ID: L6 - 01			**Matrix: Surface Water**			
-Metals-						
Arsenic	< 0.008	mg/L	ICP - OES	04/08/19	PPG	
Cadmium	< 0.001	mg/L	ICP - OES	04/08/19	PPG	
Copper	< 0.003	mg/L	ICP - OES	04/08/19	PPG	
Lead	< 0.005	mg/L	ICP - OES	04/08/19	PPG	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	04/05/19	JLJ	
Chromium	< 0.005	mg/L	ICP - OES	04/08/19	PPG	
-Microbiology-						
Total Coliforms**	3,500,000	MPN/100mL	Multiple Tube Fermentation Technique	04/05/19	CBS	
Fecal Coliforms**	1,100,000	MPN/100mL	Multiple Tube Fermentation Technique	04/05/19	CBS	
-Wet Chemistry-						
Dissolved Oxygen**	< 2	mg/L	Winkler/Titrimetric	04/05/19	MDLL	
Biological Oxygen Demand**	15	mg/L	Azide Modification Winkler (SM 5210B)	04/05/19	MDLL	
Chemical Oxygen Demand**	75	mg/L	Open Reflux Method (SM5220B)	04/15/19	LCM	
Total Suspended Solids**	20	mg/L	Gravimetry (SM2540 D)	04/09/19	MLJ	
Oil & Grease	0.62	mg/L	Gravimetry (n-Hexane Extraction)	04/10/19	PMAS	
Ammonia - N**	105	mg/L	Phenate Method (SM4500-NH3 F)	05/09/19	NGCM	
Cyanide**, Free	< 0.004	mg/L	Ion Selective Electrode (SM 4500 CN-F)	04/05/19	MPY	
>>> end of result set for Sample No.:P00091304-01 <<<						
Sample No.: P00091304-02			**DateSampled: 04-04-19 10:10**			
Sample ID: L6 - 02			**Matrix: Surface Water**			
-Metals-						
Arsenic	< 0.008	mg/L	ICP - OES	04/08/19	PPG	
Cadmium	< 0.001	mg/L	ICP - OES	04/08/19	PPG	
Copper	< 0.003	mg/L	ICP - OES	04/08/19	PPG	
Lead	< 0.005	mg/L	ICP - OES	04/08/19	PPG	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	04/05/19	JLJ	
Chromium	< 0.005	mg/L	ICP - OES	04/08/19	PPG	
-Microbiology-						
Total Coliforms**	160,000	MPN/100mL	Multiple Tube Fermentation Technique	04/05/19	CBS	
Fecal Coliforms**	54,000	MPN/100mL	Multiple Tube Fermentation Technique	04/05/19	CBS	
-Wet Chemistry-						
Dissolved Oxygen**	2	mg/L	Winkler/Titrimetric	04/05/19	MDLL	
Biological Oxygen Demand**	6	mg/L	Azide Modification Winkler (SM 5210B)	04/05/19	MDLL	
Chemical Oxygen Demand**	48	mg/L	Open Reflux Method (SM5220B)	04/15/19	LCM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.2	mg/L	Colorimetry - Chloroform Extraction	04/12/19	WBD	
Total Suspended Solids**	9.0	mg/L	Gravimetry (SM2540 D)	04/09/19	MLJ	
Oil & Grease	2.8	mg/L	Gravimetry (n-Hexane Extraction)	04/10/19	PMAS	
Ammonia - N**	33	mg/L	Phenate Method (SM4500-NH3 F)	04/10/19	NGCM	
Cyanide**, Free	< 0.004	mg/L	Ion Selective Electrode (SM 4500 CN-F)	04/05/19	MPY	
Nitrate - N**	0.6	mg/L	Colorimetry - Brucine	04/14/19	NGCM	
Phosphate - P**	1.6	mg/L	Stannous Chloride Method (SM4500-P D)	04/12/19	WBD	
>>> end of result set for Sample No.:P00091304-02 <<<						

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Jose Abad Santos Ave., CFZ Pampanga, Philippines
Tel: (6345) 599-3943 * (6345) 499-6529 * (632) 552-5100 * Fax: (6345) 599-3963

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00091304-03			**DateSampled: 04-04-19 11:05**			
Sample ID: L6 - 03			**Matrix: Surface Water**			
-Metals-						
Arsenic	< 0.008	mg/L	ICP - OES	04/08/19	PPG	
Cadmium	< 0.001	mg/L	ICP - OES	04/08/19	PPG	
Copper	< 0.003	mg/L	ICP - OES	04/08/19	PPG	
Lead	< 0.005	mg/L	ICP - OES	04/08/19	PPG	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	04/05/19	JLJ	
Chromium	< 0.005	mg/L	ICP - OES	04/08/19	PPG	
-Microbiology-						
Total Coliforms**	2,400,000	MPN/100mL	Multiple Tube Fermentation Technique	04/05/19	CBS	
Fecal Coliforms**	2,400,000	MPN/100mL	Multiple Tube Fermentation Technique	04/05/19	CBS	
-Wet Chemistry-						
Dissolved Oxygen**	< 2	mg/L	Winkler/Titrimetric	04/05/19	MDLL	
Biological Oxygen Demand**	41	mg/L	Azide Modification Winkler (SM 5210B)	04/05/19	MDLL	
Chemical Oxygen Demand**	131	mg/L	Open Reflux Method (SM5220B)	04/15/19	LCM	
Total Suspended Solids**	17	mg/L	Gravimetry (SM2540 D)	04/09/19	MLJ	
Oil & Grease	1.8	mg/L	Gravimetry (n-Hexane Extraction)	04/10/19	PMAS	
Ammonia - N**	24	mg/L	Phenate Method (SM4500-NH3 F)	04/10/19	NGCM	
Cyanide**, Free	< 0.004	mg/L	Ion Selective Electrode (SM 4500 CN-F)	04/05/19	MPY	

>>> end of result set for Sample No.:P00091304-03 <<<

>>> end of result set for Lab No.:P00091304; Total no. of samples analyzed: 3 <<<

**PAB approved parameters
MPN = Most Probable Number
Results are reported "as received basis".
Teledyne, HYDRAIIAA Mercury Analyzer
ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy
Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.
Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Page 2 of 3
ID:>>>0029C919>>>>

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• **Laboratory:** Bldg. 2, Berthaphil Compound 1, Berthaphil Inc. Industrial Park
Jose Abad Santos Ave., CFZ Pampanga, Philippines
Tel: (6345) 599-3943 * (6345) 499-6529 * (632) 552-5100 * Fax: (6345) 599-3983

Certified by:

Geraldine T. Yabut
PRC License No.: 0027218
Microbiological Testing
Date: 05/15/19

Ronald C. Espiritu
PRC License No.: 9248
Chemical Testing
Date: 05/15/19

Juliana C. Oriña
PRC License No.: 8774
Chemical Testing
Date: 5/15/19

Chas C. Arroyo
PRC License No.: 6701
Chemical Testing
Date: 5/15/19

SN: F00061508.002

CRL Environmental Corporation
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Results of Analyses

Seastems, Inc
Rm. 314, Phil. Social Science Center, Commonwealth Ave.
Diliman, Quezon City

PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2008-119C
PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2008-119C

SN: F00061492.001
Date Received: 04/05/2019
Lab No.: P00091364

Project Name: LRT LINE 6A & 6B + C
Attention: Mr. Alvin F. Nacu

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref*
Sample No.: P00091364-01			**DateSampled: 04-05-19 08:10**			
Sample ID: L6 - 04			**Matrix: Surface Water**			
-Metals-						
Arsenic	< 0.008	mg/L	ICP - OES	04/11/19	PPG	
Cadmium	< 0.001	mg/L	ICP - OES	04/11/19	PPG	
Copper	< 0.003	mg/L	ICP - OES	04/11/19	PPG	
Lead	< 0.005	mg/L	ICP - OES	04/11/19	PPG	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	04/11/19	JLJ	
Chromium	< 0.005	mg/L	ICP - OES	04/11/19	PPG	
-Microbiology-						
Total Coliforms**	1,700,000	MPN/100mL	Multiple Tube Fermentation Technique	04/06/19	CBS	
Fecal Coliforms**	700,000	MPN/100mL	Multiple Tube Fermentation Technique	04/06/19	CBS	
-Wet Chemistry-						
Dissolved Oxygen**	< 2	mg/L	Winkler/Titrimetric	04/06/19	MDLL	
Biological Oxygen Demand**	34	mg/L	Azide Modification Winkler (SM 5210B)	04/07/19	MDLL	
Chemical Oxygen Demand**	86	mg/L	Open Reflux Method (SM5220B)	04/15/19	LCM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.4	mg/L	Colorimetry - Chloroform Extraction	04/12/19	WBD	
Total Suspended Solids**	21	mg/L	Gravimetry (SM2540 D)	04/10/19	MLJ	
Oil & Grease	4.2	mg/L	Gravimetry (n-Hexane Extraction)	04/11/19	PMAS	
Ammonia - N**	28	mg/L	Phenate Method (SM4500-NH3 F)	04/10/19	NGCM	
Cyanide**, Free	< 0.004	mg/L	Ion Selective Electrode (SM 4500 CN-F)	04/07/19	MPY	
Nitrate - N**	0.7	mg/L	Colorimetry - Brucine	04/14/19	NGCM	
Phosphate - P**	0.5	mg/L	Stannous Chloride Method (SM4500-P D)	04/12/19	WBD	
>>> end of result set for Sample No.:P00091364-01 <<<						
Sample No.: P00091364-02			**DateSampled: 04-05-19 18:40**			
Sample ID: L6 - 05			**Matrix: Surface Water**			
-Metals-						
Arsenic	< 0.008	mg/L	ICP - OES	04/11/19	PPG	
Cadmium	< 0.001	mg/L	ICP - OES	04/11/19	PPG	
Copper	0.003	mg/L	ICP - OES	04/11/19	PPG	
Lead	< 0.005	mg/L	ICP - OES	04/11/19	PPG	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	04/11/19	JLJ	
Chromium	< 0.005	mg/L	ICP - OES	04/11/19	PPG	
-Microbiology-						
Total Coliforms**	540,000	MPN/100mL	Multiple Tube Fermentation Technique	04/06/19	CBS	
Fecal Coliforms**	240,000	MPN/100mL	Multiple Tube Fermentation Technique	04/06/19	CBS	
-Wet Chemistry-						
Dissolved Oxygen**	< 2	mg/L	Winkler/Titrimetric	04/06/19	MDLL	
Biological Oxygen Demand**	23	mg/L	Azide Modification Winkler (SM 5210B)	04/07/19	MDLL	
Chemical Oxygen Demand**	69	mg/L	Open Reflux Method (SM5220B)	04/15/19	LCM	
Total Suspended Solids**	18	mg/L	Gravimetry (SM2540 D)	04/10/19	MLJ	
Oil & Grease	3.8	mg/L	Gravimetry (n-Hexane Extraction)	04/11/19	PMAS	
Ammonia - N**	9.6	mg/L	Phenate Method (SM4500-NH3 F)	04/10/19	NGCM	
Cyanide**, Free	< 0.004	mg/L	Ion Selective Electrode (SM 4500 CN-F)	04/07/19	MPY	
>>> end of result set for Sample No.:P00091364-02 <<<						

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Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00091364-03			**DateSampled: 04-05-19 09:30**			
Sample ID: L6 - 06			**Matrix: Surface Water**			
-Metals-						
Arsenic	< 0.008	mg/L	ICP - OES	04/11/19	PPG	
Cadmium	< 0.001	mg/L	ICP - OES	04/11/19	PPG	
Copper	0.004	mg/L	ICP - OES	04/11/19	PPG	
Lead	< 0.005	mg/L	ICP - OES	04/11/19	PPG	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	04/11/19	JLJ	
Chromium	< 0.005	mg/L	ICP - OES	04/11/19	PPG	
-Microbiology-						
Total Coliforms**	540,000	MPN/100mL	Multiple Tube Fermentation Technique	04/06/19	CBS	
Fecal Coliforms**	240,000	MPN/100mL	Multiple Tube Fermentation Technique	04/06/19	CBS	
-Wet Chemistry-						
Dissolved Oxygen**	< 2	mg/L	Winkler/Titrimetric	04/06/19	MDLL	
Biological Oxygen Demand**	47	mg/L	Azide Modification Winkler (SM 5210B)	04/07/19	MDLL	
Chemical Oxygen Demand**	89	mg/L	Open Reflux Method (SM5220B)	04/16/19	LCM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.2	mg/L	Colorimetry - Chloroform Extraction	04/12/19	WBD	
Total Suspended Solids**	29	mg/L	Gravimetry (SM2540 D)	04/10/19	MLJ	
Oil & Grease	2.0	mg/L	Gravimetry (n-Hexane Extraction)	04/11/19	PMAS	
Ammonia - N**	10	mg/L	Phenate Method (SM4500-NH3 F)	04/10/19	NGCM	
Cyanide**, Free	< 0.004	mg/L	Ion Selective Electrode (SM 4500 CN-F)	04/07/19	MPY	
Nitrate - N**	0.5	mg/L	Colorimetry - Brucine	04/14/19	NGCM	
Phosphate - P**	0.2	mg/L	Stannous Chloride Method (SM4500-P D)	04/12/19	WBD	

>>> end of result set for Sample No.:P00091364-03 <<<

>>> end of result set for Lab No.:P00091364; Total no. of samples analyzed: 3 <<<

**PAB approved parameters
MPN = Most Probable Number
Results are reported "as received basis".
Teledyne, HYDRA/IAA Mercury Analyzer
ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy
Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.
Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition
Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020

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Certified by:

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Date: 05/08/19

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Chemical Testing
Date: 05/08/19

Juliana C. Oriña
PRC License No.: 8774
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Appendix 15. Laboratory Results of Ambient Air Quality Monitoring at the Project Alignments.

1. INTRODUCTION

Seastems, Inc. hired the services of CRL Calabarquez Corporation to conduct ambient air sampling test within the location defined on *Table 1.A*. The project includes ambient air and noise monitoring for 1 hour and 24 hours in terms of parameters listed on *Table 1.A*. Summary of sampling results for ambient air and noise monitoring were tabulated and shown in Tables 5-1 to 5-13 including that of the meteorological and operating data referred to as Annex A.

1.A Sampling Location, Compounds and Parameters Tested

Location: Metro Manila and Cavite

Sampling Station Name/Description	Parameters Tested*	
	Ambient	Noise
Station A1 In Front of Olivares College and Hospital	TSP, PM_{10}, $PM_{2.5}$, NO_2, SO_2	Yes
Station A2 Sucat Interchange	TSP, PM_{10}, $PM_{2.5}$, NO_2, SO_2	Yes
Station A3 In Front of Alabang Medical Center Las Piñas	TSP, PM_{10}, $PM_{2.5}$, NO_2, SO_2	Yes
Station A4 Madrigal Business Park	TSP, PM_{10}, $PM_{2.5}$, NO_2, SO_2	Yes
Station A5 In Front of St. Dominic College and Hospital	TSP, PM_{10}, $PM_{2.5}$, NO_2, SO_2	Yes
Station A6 In Front of Southeast Asian Medical Center	TSP, PM_{10}, $PM_{2.5}$, NO_2, SO_2	Yes
Station A7 Armstrong Village/Avida Residence	TSP, PM_{10}, $PM_{2.5}$, NO_2, SO_2	Yes
Station A8 Near Paliparan Elementary School	TSP, PM_{10}, $PM_{2.5}$, NO_2, SO_2	Yes
Station A9 Left Side Jollibee Paliparan	TSP, PM_{10}, $PM_{2.5}$, NO_2, SO_2	Yes
Station N1 MRT/LRT 1 Taft Station	--	Yes
Station N2 MRT 7 (Largo Area)	--	Yes

*TSP = Total Suspended Particulate Matter; PM_{10}= Particulate Matter at 10μ; $PM_{2.5}$ = Particulate Matter at 2.5μ; NO_2 = Nitrogen Dioxide; SO_2 = Sulfur Dioxide

This environmental sampling report presents the test results gathered by CRL Calabarquez Corporation at the project site of Seastems, Inc. located at Metro Manila and Cavite Area on March 25, 26 and April 2, 3, 5, 6 and 7, 2019. The report will be used to evaluate actual concentrations of air pollutants as baseline data at the project site. The report will also serve as a pertinent document for the firm's compliance with the Department of Environment and Natural Resources (DENR). The results are then compared with the DENR Standards under National Ambient Air Quality Standards (NAAQS) and National Ambient Air Quality Guideline Values (NAAQGV) of Republic Act 8749 or known as the Philippine Clean Air Act of 1999.

2. METHODOLOGY

2.1 AMBIENT AIR QUALITY MONITORING

2.1.1 SAMPLING EQUIPMENT

There were three (3) types of ambient air sampler used (see *Table 2.A*).

2.A Ambient Air Monitoring Equipment Specifications

Equipment	Brand/Model	Testing Capabilities*
High Volume Sampler	Tisch Environmental/5009/5170V and Graseby	TSP, PM_{10}, $PM_{2.5}$
Personal Sampler	SKC	NO_2, SO_2
Anemometer	Lutron	Wind Speed

*TSP = Total Suspended Particulate Matter; PM_{10}= Particulate Matter at 10µ; $PM_{2.5}$ = Particulate Matter at 2.5µ; NO_2 = Nitrogen Dioxide; SO_2 = Sulfur Dioxide

The high volume sampler is equipped with all weather shelter timer and flowchart meter and is powered by electricity through external power sources. The personal sampler is equipped with flow meter powered by external/internal power sources and a low flow controller. It is attached to parallel tubing with two (2) pieces of midget impingers. For SO_2, the bubbler has a straight orifice nozzle while for NO_2, the bubbler has a fritted nozzle. While for the anemometer, it has a range of 0.4m/s – 20.0m/s with 0.1m/s resolution and is calibrated against standards that are traceable to National Institute of Standards and Technology (NIST).

2.1.2 SAMPLING METHODOLOGIES

The ambient air quality monitoring conducted by CRL Calabarquez Corporation was performed at an elevation of at least two (2) meters above the ground level and sampling was strategically stationed within the project site. After sampling was conducted for each station, the gas samples were carefully recovered in the sampling bottles and preserved at low temperature and were immediately submitted to the laboratory for analysis.

2.1.2.1 FILTRATION METHOD BY HIGH VOLUME SAMPLER

TSP SAMPLING

Principle of Sampling - Ambient air was drawn through a glass fiber filter over a period of time. Particles having a diameter of 20-50 µm were collected ordinarily. The filter paper containing the sample was weighed; hence, the final weight of the sample over that of the standard volume of air sampled gave the concentration of TSP.

2.1.2.2 FILTRATION METHOD BY HIGH VOLUME SAMPLER

PM_{10} SAMPLING

Principle of Sampling - Ambient air, with particle size less than 10µm was entered in a Tisch Environmental 10µ inlet by means of vacuum system. The air passes through a venturi type casing resulting to a flow rate of approximately 40 cubic feet per minute. The particles were collected in a glass fiber filter and determined by measuring gravimetrically. The filter paper containing the sample was weighed hence the final weight of the sample over that of the standard volume of air sampled gave the concentration of PM_{10}.

2.1.2.3 FILTRATION METHOD BY HIGH VOLUME SAMPLER

$PM_{2.5}$ SAMPLING

Principle of Sampling - Ambient air, with particle size less than 2.5µm was entered in a high volume sampler 2.5µ inlet by means of vacuum system. The air passes through a venturi type casing resulting to a flow rate of approximately 40 cubic feet per minute. The particles were collected in a glass fiber filter and determined by measuring gravimetrically. The filter paper containing the sample was weighed hence the final weight of the sample over that of the standard volume of air sampled gave the concentration of $PM_{2.5}$.

2.1.2.4 ABSORPTION IN LIQUIDS FOR GASEOUS POLLUTANTS

NO_2, SO_2 SAMPLING

Principle of Sampling - A known volume of air was sampled with a wet-chemical system where a constant volume of air sample passes through a suitable reagent (absorbing reagent) that was reactive to the specific pollutant desired. As the air sample passes through the bubbler rack, the air diffuses forming air bubbles and slowly reacts to the chemical reagent forming a complex ion. The personal sampler was calibrated with NIST traceable digital calibrator to assure its accuracy. The samples were then analyzed using prescribed and approved methods.

2.2 AMBIENT NOISE QUALITY MONITORING

2.2.1 SAMPLING EQUIPMENT

A digital sound level meter (precision type) was used in the noise monitoring activity conducted by CRL Calabarquez Corporation. The sound level meter used was Lutron that meets the ANSI-SI.4 1983 standard. The equipment has A weighting of 30 dB and maximum of 130 dB and resolution of 0.1 dB. This noise meter has internal oscillation system with 1Khzsquare wave generator for calibration.

2.2.2 SAMPLING METHODOLOGIES

The noise measurement was conducted within Eleven (11) stations. The lowest and highest noise levels monitored were manually recorded. The multiple sounds reading each station was recorded and summarized by getting its logarithmic average. The result of this gave the equivalent noise level (Leq).

3. SAMPLING LOCATION

The eleven (11) sampling stations were positioned within the project site. These stations were pre-selected and were strategically distributed in order to evaluate the present air quality in the said vicinity. The nine (9) locations ambient air and eleven (11) locations noise were discussed with customer representative prior to the actual sampling (see sampling location defined on *Table 1.A*).

4. PERSONNEL INVOLVED

4.A Ambient Air and Noise Monitoring Sampler(s)

CRL Calabarquez Corporation

Name	Designation
Liberato T. Bitas	Field Technician II
Jhomar S. Matibag	Field Technician
Marcelo R. Toledo	Field Technician/Driver

4.B Observer(s)

Name	Designation
None	

5. RESULTS AND DISCUSSIONS

Table 5-1

Observed 24-hour Ambient Air Concentrations of parameters listed on *Table 1.A* in comparison with the NAAQS/NAAQGV (in µg/Ncm)

Station No.	Location	Date and Time of Sampling	TSP	PM_{10}	$PM_{2.5}$	NO_2	SO_2
A2	Sucat Interchange	25-Mar-19 1545H - 1645H	16.9	9.3	4.9	ND	ND
A3	In Front of Alabang Medical Center Las Piñas	26-Mar-19 1000H - 1100H	38.5	22.5	17.3	14.9	ND
A4	Madrigal Business Park	26-Mar-19 1115H - 1215H	47.2	28.1	16.5	ND	ND
A5	In Front of St. Dominic College and Hospital	25-Mar-19 1245H - 1345H	44.6	17.3	10.6	ND	ND
A7	Armstrong Village/Avida Residence	25-Mar-19 1000H - 1100H	66.9	33.5	17.4	ND	ND
A8	Near Paliparan Elementary School	6-Apr-19 1515H - 1615H	65.4	19.5	16.7	17.0	ND
DENR Standard (NAAQS/NAAQGV)		1-hr Sampling	300	200	50*	260	340

ND = Not Detected or Below the Method Detection Limit for NO_2 = 0.26µg, SO_2 = 0.75µg
*Evaluation of this standard is carried out for 24-hour averaging time

Table 5-2

Observed 24-hour Ambient Air Concentrations of parameters listed on *Table 1.A* in comparison with the NAAQGV (in µg/Ncm)

Station No.	Location	Date and Time of Sampling	TSP	PM_{10}	$PM_{2.5}$	NO_2	SO_2
A1	In Front of Olivarez College and Hospital	April 6 to 7, 2019 1705H - 1705H	83.7	62.4	8.5	15.2	ND
A6	In Front of Southeast Asian Medical Center	April 4 to 5, 2019 1045H - 1045H	73.5	28.1	13.9	9.7	ND
A9	Left Side of Jollibee Paliparan	April 5 to 6, 2019 1445H - 1445H	71.6	*179.8*	70.8	33.2	ND
DENR Standard (NAAQGV)		24-hr Sampling	**230**	**150**	**50***	**150**	**180**

ND = Not Detected or Below the Method Detection Limit for SO_2 = 0.75µg
*Evaluation of this standard is carried out for 24-hour averaging time

Tables 5-1 and 5-2 present the results of sampling and analysis conducted from the nine (9) stations in comparison with the NAAQS/NAAQGV prescribed limit under Republic Act 8749 (Clean Air Act) Implementing Rules and Regulations.

5.A Ambient Air Monitoring Result/Conclusion

Parameters	Result/Conclusion
TSP	All Stations Passed the DENR Standard
PM_{10}	All Stations Passed the DENR Standard except for Station A9
$PM_{2.5}$	All Stations Passed the DENR Standard
NO_2	All Stations Passed the DENR Standard
SO_2	All Stations Passed the DENR Standard

Appendix 16. Sound Measurements along the LRT 6 Project Alignments.

Date: April 2 to 3, 2019
Time: 1020H - 1020H
Station MRT 3 / LRT 1 Taft Station

Morning 0500H - 0900H			Daytime 0900H - 1800H		
Time	Reading	Noise Sources	Time	Reading	Noise Sources
0500H	72.4	Noise came from vehicular movement fom south to north, busy public area, people shouting	0900H	87.8	Noise came from busy street, vehicular movement from south to north, sound of train passing and people shouting
0505H	75.6	Noise came from vehicular movement fom south to north, busy public area, people shouting	0905H	90.2	Noise came from busy street, busy public area and vehicular movement from south to north
0510H	73.4	Noise came from train passing LRT 1 going to Monumento and vendors	0910H	89.9	Noise came from busy street, busy public area, vehicular movement from south to north and people shouting
0515H	74.9	Noise came from vehicular movements, vendors, vehicles horn and busy public area	0915H	90.4	Noise came from train passing at MRT, busy street, busy public area and vehicular movement from south to north
0520H	75.6	Noise came from vehicular movements, vendors, vehicles horn and busy public area	0920H	86.5	Noise came from train passing at MRT 3/LRT 1, vehicular movement, busy street and busy public area
0525H	73.9	Noise came from traing passing MRT 3 going to Cubao, motorcycle, jeep, bus and long vehicles	0925H	90.6	Noise came from vehicular movement, train passing at LRT 1, busy public area and people shouting
0530H	70.9	Nose came from heavy vehicular movement, booth side, vendors, busy public area	0930H	91.5	Noise came from vehicular movement from north to south, busy street and busy public area
0535H	76.3	Nose came from heavy vehicular movement, booth side, vendors, busy public area	0935H	89.4	Noise came from train passing MRT 1, vehicles passing from north to south and busy street
0540H	75.6	Nose came from heavy vehicular movement, booth side, vendors, busy public area	0940H	89.6	Noise came from vehicular movement from south to north, train passing both at MRT 3/LRT 1 and busy street
0545H	74.9	Noise came from heavy vehicular movement, busy public area and busy street	0945H	86.7	Noise came from busy street, vehicular movement and train passing LRT 1

Date: April 5 to 6, 2019
Time: 1445H - 1445H
Station A9 **Left Side of Jollibee Paliparan**

Morning			Daytime		
0500H - 0900H		Noise Sources	0900H - 1800H		Noise Sources
Time	Reading		Time	Reading	
0500H	66.5	Noise came from vehicles passing, busy street and busy public area	0900H	79.9	Noise came from busy street, busy public area, vehicles passing and vehicles horn
0505H	66.9	Noise came from vehicles passing, busy street and busy public area	0905H	78.4	Noise came from busy street, busy public area, vehicles passing and vehicles horn
0510H	65.5	Noise came from vehicles passing, busy street and busy public area	0910H	73.5	Noise came from busy street, busy public area, vehicles passing and vehicles horn
0515H	62.4	Noise came from vehicles passing, busy street and busy public area	0915H	79.6	Noise came from busy street, busy public area, vehicles passing and vehicles horn
0520H	66.4	Noise came from vehicles passing, busy street and busy public area	0920H	69.7	Noise came from heavy vehicular movement, busy street and busy public area
0525H	70.2	Noise came from vehicles passing, busy street and busy public area	0925H	77.8	Noise came from heavy vehicular movement, busy street and busy public area
0530H	68.7	Noise came from vehicles passing, busy street and busy public area	0930H	74.8	Noise came from heavy vehicular movement, busy street and busy public area
0535H	68.8	Noise came from vehicles passing, busy street and busy public area	0935H	74.5	Noise came from heavy vehicular movement, busy street and busy public area
0540H	69.7	Noise came from vehicles passing, busy street and busy public area	0940H	68.4	Noise came from heavy volume of vehicular movement going to north, bust street and busy public area
0545H	74.6	Noise came from vehicles passing, busy street and busy public area	0945H	70.6	Noise came from heavy volume of vehicular movement going to north, bust street and busy public area
0550H	66.2	Noise came from vehicles passing, busy street and busy public area	0950H	77.4	Noise came from heavy volume of vehicular movement going to north, bust street and busy public area
0555H	65.6	Noise came from vehicles passing, busy street and busy public area	0955H	79.6	Noise came from heavy volume of vehicular movement going to north, bust street and busy public area

Date: April 4 to 5, 2019
Time: 1045H - 1045H

Station A6 Infront of Southeast Asian Medical Center

Morning 0500H - 0900H			Daytime 0900H - 1800H		
Time	Reading	Noise Sources	Time	Reading	Noise Sources
0500H	65.6	Noise came from vehicles passing, people shouting and busy public area	0900H	64.5	Noise came from vehicles passing, vehicles horn, busy street and busy public area
0505H	63.9	Noise came from vehicles	0905H	63	Noise came from vehicles
0510H	66.7	Noise came from vehicles passing, people shouting and busy public area	0910H	65.6	Noise came from vehicles passing, vehicles horn, busy street and busy public area
0515H	62.2	Noise came from vehicles passing, people shouting and busy public area	0915H	62.9	Noise came from vehicles passing, vehicles horn, busy street and busy public area
0520H	65.6	Noise came from vehicles passing, vehicles horn, busy public area and busy street	0920H	64.5	Noise came from vehicular movement, busy street and busy public area
0525H	63.8	Noise came from vehicles passing, vehicles horn, busy public area and busy street	0925H	61.9	Noise came from vehicular movement, busy street and busy public area
0530H	65.6	Noise came from vehicles passing, vehicles horn, busy public area and busy street	0930H	63.9	Noise came from vehicular movement, busy street and busy public area
0535H	64.5	Noise came from vehicles passing, vehicles horn, busy public area and busy street	0935H	61.6	Noise came from vehicular movement, busy street and busy public area
0540H	63.6	Noise came from vehicles passing, vehicles horn, busy public area and busy street	0940H	94.5	Noise came from vehicular movement, busy street and busy public area
0545H	66.7	Noise came from vehicles passing, vehicles horn, busy public area and busy street	0945H	63.9	Noise came from vehicular movement, busy street and busy public area
0550H	64.5	Noise came from vehicles passing, vehicles horn, busy public area and busy street	0950H	64.3	Noise came from vehicular movement, busy street and busy public area
0555H	64.6	Noise came from vehicles passing, vehicles horn, busy public area and busy street	0955H	63.9	Noise came from vehicular movement, busy street and busy public area
0600H	63.9	Noise came from vehicles passing by, people shouting and busy public area	1000H	64.5	Noise came from vehicular movement, busy street and busy public area
0605H	66.2	Noise came from vehicles passing by, people shouting and busy public area	1005H	64.7	Noise came from vehicular movement, busy street, busy public area and wind propagation

Date: April 2 to 3, 2019
Time: 1140H - 1140H
Station **MRT 7 Construction at Lagro Area**

Morning 0500H - 0900H			Daytime 0900H - 1800H		
Time	Reading	Noise Sources	Time	Reading	Noise Sources
0500H	75.8	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.	0900H	69.8	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.
0505H	71.2	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.	0905H	75.2	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.
0510H	73.7	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.	0910H	77.7	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.
0515H	75.8	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.	0915H	75	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.
0520H	70.6	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.	0920H	74.8	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.
0525H	71.2	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.	0925H	76.4	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.
0530H	68.3	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.	0930H	71.2	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.
0535H	64.4	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.	0935H	65.8	Most of the time noise reading came from passing vehicle in national highway like private vehicle, bus, truck, jeep, etc.

Date: April 6 to 7, 2019
Time: 1705H - 1705H
Station A5 In Front of Olivares College and Hospital

Morning 0500H - 0900H			Daytime 0900H - 1800H		
Time	Reading	Noise Sources	Time	Reading	Noise Sources
0500H	73.2	Noise came from busy street at national highway	0900H	75.2	Noise came from busy street at national highway
0505H	74.6	Noise came from busy street at national highway	0905H	76.8	Noise came from busy street at national highway
0510H	78.1	Noise came from busy street at national highway	0910H	70.3	Noise came from busy street at national highway
0515H	75.3	Noise came from busy street at national highway	0915H	71.2	Noise came from busy street at national highway
0520H	72.2	Noise came from busy street at national highway	0920H	70.8	Noise came from busy street at national highway
0525H	70.4	Noise came from busy street at national highway	0925H	76.3	Noise came from busy street at national highway
0530H	76.1	Noise came from busy street at national highway	0930H	81.2	Noise came from busy street at national highway
0535H	69.8	Noise came from busy street at national highway	0935H	80.4	Noise came from busy street at national highway
0540H	73.4	Noise came from busy street at national highway	0940H	83.2	Noise came from busy street at national highway
0545H	76.1	Noise came from busy street at national highway	0945H	73.2	Noise came from busy street at national highway
0550H	73.8	Noise came from busy street at national highway	0950H	72.8	Noise came from busy street at national highway
0555H	70.6	Noise came from busy street at national highway	0955H	70.6	Noise came from busy street at national highway
0600H	72.3	Noise came from busy street at national highway	1000H	69.1	Noise came from busy street at national highway
0605H	70.4	Noise came from busy street at national highway	1005H	63.8	Noise came from busy street at national highway
0610H	73.8	Noise came from busy street at national highway	1010H	65.3	Noise came from busy street at national highway
0615H	81.2	Noise came from busy street at national highway	1015H	71.2	Noise came from busy street at national highway
0620H	85.6	Noise came from busy street at national highway	1020H	74.6	Noise came from busy street at national highway
0625H	81.2	Noise came from busy street at national highway	1025H	63.2	Noise came from busy street at national highway
0630H	83.6	Noise came from busy street at national highway	1030H	69.5	Noise came from busy street at national highway
0635H	85.4	Noise came from busy street at national highway	1035H	64.8	Noise came from busy street at national highway
0640H	80.3	Noise came from busy street at national highway	1040H	71.2	Noise came from busy street at national highway

Results of Noise Level Measurements

Client: **Seastems, Inc.**
Address: **Cavite Area 1, Las Piñas**
Date Sampled: **March 25, 2019**
Time: **1000H - 1100H**
Station A7 **Armstrong Village/Avida Residence**

Sampling Time	North		East		South		West		Min	Max	Ave_{Leq}	REMARKS
1000H - 1005H	65.8	70.4	71.8	74.6	70.8	73.6	72.6	75.6	*70.9*	*73.9*	**72.7**	Noise came from busy street and main road
1005H - 1010H	71.2	74.6	72.2	78.6	71.2	75.8	73.8	76.4	*72.2*	*76.6*	**74.9**	Noise came from busy street
1010H - 1015H	69.8	71.2	70.3	76.3	65.4	70.8	64.9	68.3	*68.3*	*72.7*	**71.0**	Noise came from busy street
1015H - 1020H	70.6	75.8	71.2	72.6	69.6	72.8	68.3	69.4	*70.1*	*73.2*	**71.9**	Noise came from busy street
1020H - 1025H	65.6	69.8	69.8	73.4	69.5	70.4	69.7	74.6	*69.0*	*72.5*	**71.1**	Noise came from busy street
1025H - 1030H	72.3	78.6	70.3	75.6	70.4	75.6	70.4	73.8	*70.9*	*76.3*	**74.4**	Noise came from busy street
1030H - 1035H	71.8	74.6	68.2	76.4	71.8	72.6	71.2	79.8	*71.0*	*76.7*	**74.7**	Noise came from busy street and vehicle horn
1035H - 1040H	63.8	69.1	65.6	69.8	68.3	75.6	70.4	75.8	*67.7*	*73.6*	**71.6**	Noise came from busy street
1040H - 1045H	65.2	74.8	70.2	74.8	69.4	72.3	69.5	72.8	*68.9*	*73.8*	**72.0**	Noise came from busy street
1045H - 1050H	69.4	72.3	68.3	71.2	70.6	75.8	67.3	69.8	*69.1*	*72.9*	**71.4**	Noise came from busy street
1050H - 1055H	70.8	76.6	69.8	74.6	63.2	65.8	69.8	74.6	*69.2*	*74.3*	**72.4**	Noise came from busy street
1055H - 1100H	71.8	73.6	69.7	75.6	68.2	69.4	65.8	71.2	*69.4*	*73.1*	**71.6**	Noise came from busy street
									AveLeq		**72.7**	

Appendix 17. Population of Host Barangays in the Five Host Cities (PSA, 2015)

CITY OF MUNTINLUPA	504,509
Alabang	63,793
Bayanan	36,673
Buli	9,292
Cupang	58,331
Poblacion	115,387
Putatan	89,022
Sucat	57,504
Tunasan	53,078
New Alabang Village	21,429

CITY OF PARAÑAQUE	665,822
Baclaran	28,385
Don Galo	11,645
La Huerta	9,569
San Dionisio	63,506
Santo Niño	34,860
Tambo	25,699
B. F. Homes	88,035
Don Bosco	52,297
Marcelo Green Village	34,554
Merville	27,508
Moonwalk	67,723
San Antonio	67,401
San Isidro	78,912
San Martin De Porres	21,181
Sun Valley	48,913
Vitalez	5,634

CITY OF LAS PIÑAS	588,894
Almanza Uno	30,405
Daniel Fajardo	10,425
Elias Aldana	10,402
Ilaya	6,055
Manuyo Uno	15,405
Pamplona Uno	18,577
Pulang Lupa Uno	31,401
Talon Uno	34,821
Zapote	20,771
Almanza Dos	37,595
B. F. International Village	77,264
Manuyo Dos	37,007
Pamplona Dos	10,765
Pamplona Tres	35,612
Pilar	31,459
Pulang Lupa Dos	33,171
Talon Dos	53,091
Talon Tres	27,874
Talon Kuatro	21,420
Talon Singko	45,374

BACOOR CITY	600,609
Alima	5,853
Aniban I	3,372
Banalo	2,847
Bayanan	11,522
Daang Bukid	2,967
Digman	2,249
Dulong Bayan	7,838
Habay I	17,747
Kaingin (Pob.)	3,688
Ligas I	4,375
Mabolo I	997
Maliksi I	6,169
Mambog I	11,389
Molino I	11,926
Niog I	5,769
P.F. Espiritu I (Panapaan)	4,070
Real I	4,890
Salinas I	13,926
San Nicolas I	7,235
Sineguelasan	6,073
Tabing Dagat	3,902
Talaba I	2,757
Zapote I	6,244
Queens Row Central	5,373
Queens Row East	17,057
Queens Row West	12,763
Aniban II	3,267
Aniban III	900
Aniban IV	2,003
Aniban V	2,659
Campo Santo	1,418
Habay II	11,276
Ligas II	4,918
Ligas III	7,989
Mabolo II	1,335
Mabolo III	2,123
Maliksi II	2,375
Maliksi III	5,643
Mambog II	5,083
Mambog III	16,882
Mambog IV	9,434
Mambog V	3,238
Molino II	37,396
Molino III	58,663
Molino IV	51,362
Molino V	5,198
Molino VI	18,100
Molino VII	11,789
Niog II	6,651
Niog III	5,478
P.F. Espiritu II	2,358

P.F. Espiritu III	4,341
P.F. Espiritu IV	10,482
P.F. Espiritu V	5,627
P.F. Espiritu VI	2,981
P.F. Espiritu VII	3,160
P.F. Espiritu VIII	5,300
Real II	4,223
Salinas II	4,630
Salinas III	1,563
Salinas IV	1,320
San Nicolas II	11,285
San Nicolas III	32,221
Talaba II	11,724
Talaba III	1,520
Talaba IV	3,001
Talaba V	1,786
Talaba VI	2,489
Talaba VII	3,107
Zapote II	4,298
Zapote III	3,554
Zapote IV	2,121
Zapote V	19,340

CITY OF DASMARIÑAS	659,019
Burol	8,260
Langkaan I	21,426
Paliparan I	7,153
Sabang	14,680
Salawag	80,136
Salitran I	5,626
Sampaloc I	6,612
San Agustin I	8,471
San Jose	8,955
Zone I (Pob.)	3,756
Zone II (Pob.)	1,258
Zone III (Pob.)	5,168
Zone IV (Pob.)	3,271
Datu Esmael (Bago-a-ingud)	13,112
Emmanuel Bergado I	7,386
Fatima I	6,291
Luzviminda I	3,285
Saint Peter I	2,553
San Andres I	3,173
San Antonio De Padua I	3,110
San Dionisio (Barangay 1)	6,980
San Esteban (Barangay 4)	4,219
San Francisco I	3,030
San Isidro Labrador I	5,237
San Juan (San Juan I)	3,612
San Lorenzo Ruiz I	3,190
San Luis I	3,921
San Manuel I	2,703

San Mateo	4,877
San Miguel	4,240
San Nicolas I	2,005
San Roque (Sta. Cristina II)	2,949
San Simon (Barangay 7)	6,909
Santa Cristina I	3,219
Santa Cruz I	4,864
Santa Fe	6,750
Santa Lucia (San Juan II)	6,754
Santa Maria (Barangay 20)	5,135
Santo Cristo (Barangay 3)	4,635
Santo Niño I	2,847
Burol I	15,751
Burol II	4,838
Burol III	9,077
Emmanuel Bergado II	2,982
Fatima II	4,023
Fatima III	3,712
Langkaan II	30,197
Luzviminda II	4,688
Paliparan II	17,881
Paliparan III	68,224
Saint Peter II	2,462
Salitran II	11,371
Salitran III	14,949
Salitran IV	8,643
Sampaloc II	14,127
Sampaloc III	10,469
Sampaloc IV	39,950
Sampaloc V	3,224
San Agustin II	10,514
San Agustin III	10,204
San Andres II	3,455
San Antonio De Padua II	3,091
San Francisco II	3,495
San Isidro Labrador II	2,194
San Lorenzo Ruiz II	4,109
San Luis II	4,524
San Manuel II	3,037
San Miguel II	2,390
San Nicolas II	4,851
Santa Cristina II	3,782
Santa Cruz II	2,323
Santo Niño II	2,736
Zone I-B	6,263
H-2	9,477
Victoria Reyes	14,248

https://psa.gov.ph/content/highlights-philippine-population-2015-census-population

APPENDIX 18. MATRIX OF AFFECTED PROPERTIES AND STRUCTURE ALONG LRT LINE 6 ALIGNMENT.

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
Curve 3, Marcos Alvarez Extension, Barangay Talon 5, Las Piñas City						
1. 200 sqm residential/micro-commercial property (two floor house and 6 small one level micro-commercial spaces but only 4 are occupied	a) Property owner: Maximo Belisario, 72years old	Bought land in 1982	Yes	Accepts the project but also sees negative impacts, like a) closing off air space of the road, and b) eating up part of the current road.	Yes. Because it is a government project. It will also facilitate transportation to Cavite.	He has experienced giving up part of his property twice for road widening and drainage system construction. If possible, the project can be constructed on vacant lots behind the built up area.
	b) Renter/Business Owner Buko Center (10-15 sqm)	Started renting in 2017	Business Owner - No Storekeeper - Yes	No answer	No, place for business will be lost. Ergo, no more livelihood. It depends on the property and business owners	Rent: P2,500/month P700 daily sales
	c) Renter/Tailoring Shop Owner, Felix Bendana (10-15 sqm)	Started renting in 2017	Yes	Accepts the project Project will make transportation quicker and more comfortable.	Yes, because it is a government project and it depends on the property owner	Rent: P3,500/month Earns P10,000/month net His family lives in Molino, Bacoor City
	d) Renter/Auto-Electrical shop (10-15 sqm) Owner: Jun Parili, 51	Started renting 2004 (15years)	Yes	Accepts the project because there will be quicker transportation and less traffic; but Project will displace several families.	Yes, because it is a government project; it depends on the property owner.	Rent: P5000/month Earns (P12-15,000/month Family of 3, lives in the same rented space. Requests financial assistance in case of displacement.
	e) Renter/LL Electronics Repair Shop (10-15 sqm) Owner: Leonardo Rosello, 46	Started renting in 2003 (16 years)	Yes	Accepts the project because project will facilitate quicker transportation; increase in business activity	Yes, because it is government project; it depends on the owner	Rent: P4000/month Earns P40,000/month Family lives in Green Valley, San Nicolas 3 Bacoor City

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
	f) Daughter of property owner/Plastic and Kitchen Ware Store Business Owner Jennifer Norico	Started Business in 2000 Does not pay rent, because she is the daughter of property owner	Yes	Accepts the project	No. It is difficult to accept the project as business will be severely affected, especially if the area needed from family property is big	No rent: family property Earns P25,000 net Her family lives in Golden Acres Subdivision
2. 370 sqm Residential/micro commercial property	a) Property owner Gerardo Apinidad		No. Not on site when the data gathering was done.	NA	NA	NA
	b) Renter Erani Cana MYA Junkshop	Closed at the time of data gathering	No. Not on site when the data gathering was done.	NA	NA	NA
	c) Renter/Jeslin Catering/Carinderia Rose Emoner	Started business in 2017	Yes	Accepts the project, because of benefits: faster transportation to NCR/Region 4a	No, because of business and livelihood loss; current business is sole source of family income	Rent: P2,500 Gross income P1000/day One worker
	d) Renter/Jam and James Store Janet Babor	Started business in 2014	Yes	Accepts the project as it will make transportation faster; but many may be physically and economically displaced.	No. Because business will be affected. Alternative commercial space may be difficult to find. But they defer to the landowner.	Rent: recently raised to P10,000 from P7,000/month Income: P30,000/month
	e) 2D Express	Closed at the time of data gathering	No	NA	NA	NA
3. 250 sqm Micro commercial property with 3 one floor semi-permanent business rental spaces	a) Property Owner Charles Honrado	Bought property in 1985	Yes	Don't know yet. But please build the project somewhere else. There are vacant areas behind the built up area	Don't know yet. Build your project somewhere else.	He has residential property beside the project affected area.
	b) Renter//Hardware/ Construction Supply	Started business in 2018	Yes	No. Project will affect business. But he recognizes benefits of rapid mass transit.	Maybe, if we will be compensated for disturbance and loss of livelihood	Rent: P5000/month Did not disclose income. Observed that land values dramatically

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
	Business Owner: Sonny Carpo					increased since the 1990s.
	c) Renter/Ace Shop	Closed at the time of data gathering	No	NA	NA	NA
	d) Renter/Arabia Salon	Closed at the time of data gathering	No	NA	NA	NA
	e) Renter/Small tailoring shop (3sqm) Gabriel Honrado	Started business in 2010	Yes	No. Project will eat up part of narrow road.	No. But we cannot do anything if government wants to do the project	Rent: P600/month Income: P7,000/month Lives in Royal South subdivision Project should be done in the shortest time possible to avoid inconvenience.
	f) Paint Center of Charles Honrado					
4. 250 sqm Micro commercial property with 2 renters	a) Property owner Yolanda Valenciano	No data	No	NA	NA	NA
	b) Renter/Dan Auto Electrical Shop (10 sqm) with 2 workers Business Owner: Dandy Castillo	Started business 20 years ago	Yes	Yes to the project. It will help those working in Makati. Short term negative impacts. Traffic during construction should be addressed.	Cannot decide because respondent in only a renter	Rent: P5000/month Income: P16,000 average Family lives in Macopa St.
	c) RenterVulcanizing shop (15 sqm) Owned by: Jerson Gatasin	Started business in 2010	Yes	Yes to the project, because it is a fast means of transportation.	No. We will lose our space and livelihood and customers because of project	Rent: P5,000 Income: P7000/month net With 3workers
5. 2 floor residential house and lot in Manuela subdivision with one micro commercial renter	a) Property owner Ernesto Malagos	No data	No	NA	NA	NA
	b) Renter/Hardware	Closed	No	NA	NA	NA

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
	store					
Subtotal:	**5 property owners (3residential/commercial; 2 purely commercial) 16 renters/business owners**		**2 property owners were interviewed 11 renter/business owners were interviewed 5 shops were closed.**	**Yes- 9 No -2 Don't know-1 No Answer -1**	**Yes- 4 No- 6 Maybe-1 Cannot decide-2**	
Curve 2, Marcos Alvarez Extension, Barangay Talon 5, Las Piñas City						
1. 20 sqm micro commercial space	a) Property owner: unknown	No data	No	NA	NA	NA
	b) Renter/Baliwag Lechon Manok	Started renting in 2018	Yes: respondent: sales crew	Yes, because it is a government project.	It depends on the landowner and business owner.	Rent: P12,000/month Income; P12,000/day for 3 shifts Total: 3 workers Business owner lives in Pilar Village
2. 800 sqm lot used as gasoline station	a) Landowner: no data	NA	No.	NA	NA	NA
	b) Renter: Maxi Fuel Gas Station Manager is Mr. Avisu Panay Avenue Main office	Started business in 2014	Property Owner and Business Owner not on site during data gathering Respondent: Cashier	Yes, traffic solution Negative: foresees road widening; decrease in motor vehicles, not good for business.	It depends on the property and business owners. Proper talks is needed especially if small area is needed.	Rent: don't know Income: P45,000/shift x 2 shifts 10 workers Cashier:P542/day Pump attendants:P537/day
3. 300 sqm lot with 7/11 Convenience Store	a) Landowner: no data	NA	No	NA	NA	NA
	b) Renter: 7/11 Convenience Store Business owner: no data	Business started 2013	Business owner No. Staff refused to answer.	NA	NA	NA
4. Greenhills Arcade at least 1200 sqm, one floor concrete commercial building managed by Sam	a) Landowner: no data	NA	NA	NA	NA	NA

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
and Jamil Guro, contract with owner is 15 years Lot used to be a garbage dumpsite						
	b) Holder of lease contract: Sam and Jamil Guro	Started lease agreement in 2015	Yes	Yes. because project will bring about fast transportation and easier commute of passengers; But with apprehensions about: ROW acquisition, disturbance/loss of livelihood	Yes. We cannot defy government projects; Recommends to proponent to do things the right way; IEC with affected parties; proper negotiations for ROW; early notice to affected parties	Lease: no data Income: no data Lives in Saniata Village, beside Soldiers Village, Talon 5. They developed the property
	c) Renter: Easy Day Shop/Minimart (one of 20 branches) Business Owner: no data Operations Manager: Rowel Imperial	Business started in Dec 2017	Business Owner: not on site during data gathering Respondent: Rowena Palasique, store manager	Cannot answer in behalf of business owner	Cannot answer in behalf of business owner	Rent: don't know
	d) Renter: Bugoy Lechon Manok (6sqm) Franchise owner: Raymundo Lapad. 40 years old	Business started in 2013	Yes	Yes to the project as it is a fast means of transportation; but sees negative effects like: displacement of houses and business	Yes because people cannot say no to government projects; proponent should address ROW acquisition of properly and provide relocation to the displaced parties	Rent: P9000/month Income: P10,000-P12,000/ month net
	e) Renter: Minute Burger Stall (15-20sqm) Business Owner: Ms. Agnes	Business started April 2019	No Respondent was Food handler: Ellen	Yes. Project will deliver fast means of transportation; but jeeps, buses may lose some income.	Yes. For the good of the people. There should be terminal where passengers board and alight from the train	Rent: P15,000/month Income: P5000/day Worker: P400/day

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
5. 600 sqm commercial space	a) Landowner: Tony Manrique	NA	No. Not on site during data gathering	NA	NA	NA
	b) Renter: Kentareon Hardware Business Owner: White Ann Carreon	Took over business from parents in 2015	No. Not on site during data gathering Respondent was Caretaker: Gilbert	Yes to the project. Transportation will be faster, business will increase. Sees disturbance during construction	It is the property and business who will decide.	Rent: P12,500/month Gross sales: P60-80,000/day
6. Small Commercial space	a) Property owner: no data	NA	No	NA	NA	NA
	b) Renter: Mr. Liempo		No. Closed at the time of data gathering	NA	NA	NA
	c) Renter: Dress Shop and Clothing Store Business owner: Felicidad Gonzaga	Started business in Dec. 2018	No. Not on site during data gathering Respondent: Jonalyn (sewer)	Yes to the project which will bring faster transportation and solve traffic problem	Yes. We will find another business location.	Rent: no data Sales : P800-P1000/day
7. Small commercial space	a) Property owner: no data	NA	No. Not on site during data gathering	NA	NA	NA
	b) Renter: Lotto outlet/OTB (2.5 sqm)	Business started in 2016	No. Not on site during data gathering Respondent: Marisol Paelinawin (cashier)	Yes. Project will improve transportation and traffic	Yes but displaced people should be properly relocated; disturbed business should be compensated	Rent: No data Gross sales; P300,000 3 workers
	c) Renter: DenJun Salon and Spa (20 sqm) Business owner: no data	Business started in 2012	No. Not on site during data gathering Respondent: Lovely Subong (cashier)	Yes, big help to commuters	Cannot answer for business owner But we like the project. Proponent should talk with affected parties early and properly.	Rent: P10,000/month Gross sales: P25-30,000/month 4 workers

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
					Recommends that project be unlike MRT with so many problems and materials/equipment not made in China	
	d) Poultry Supply		No.Closed at the time of data gathering	NA	NA	NA
Subtotal	**7 property owners 1 property lessor/manager 12 renters/Business owners (4 SMEs; 8 micro enterprises)**		**No property owners were interviewed. 1 Property manager was interviewed 2 shops were closed. One business owner was interviewed; 9 representatives/staff of business owners were interviewed.**	**Yes-9 No Can't answer - 2**	**Yes -4 Conditional Yes- 2 No Can't answer for property/business owner -5**	
Curve 1 Marcos Alvarez Extension, Barangay Talon 5, Las Piñas City						
1. 150 sqm lot with one floor micro commercial structure	a) Landowner Sister (in the US) of Marie Holazo, from Sta. Rosa, Laguna	NA	No	NA	NA	NA
	b) Renter/JMA Tinsmith Shop (50 sqm) Business Owner: Jerry Alfaro, 61 years old	Started business in 2007	Yes	Yes, fast means of transportation	Yes, because it is a government project. It is up to the owner to decide.	Rent: P12,000/month Income : did not answer
	c) Tire shop but already closed and about to be vacated with a residential	Don't know	No Driver: Rodolfo Pascual was interviewed	Yes, LRT is ok	I don't know	Rent: P10,000/month

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
	portion Business owner: Marlon from QC					
2. Unknown area Gated Swimming Pool Facility but rather old and not maintained	No data Neighbors said it is seldom open.	Neighbors said it opened in 2013. Facility was operating well until 2015	Closed at the time of data gathering	NA	NA	NA
3. 700 sqm with 2 door and 2 storey commercial apartment Gated warehouse with 2 door apartment units	a) No data Neighbors said the Chinese owner vacated the place several years ago. The place has a caretaker but no one answered our knocks	No data	Closed at the time of data gathering	NA	NA	NA
	b) Renter: ZJJ Corp Gas Store (5-10 sqm) Business Owner: RV Jimenez	Started business April 2019	No. Owner not on site at the time of data gathering. Respondent: Juliet Marfega (store staff)	Yes. LRT is a fast means of transportation	Yes. But property owner has the final say.	Rent:P6,000/month Income: No basis yet. Shop is very new. 3 workers
4. App. 700 sqm lot house and m commercial structure in front	a) Property owner	NA	No. Owner not on site at the time of data gathering.	NA	NA	NA
	b) Renter/Bakery Supplies Business owner: Esperanza Bantilo	2011 (8 years)	Yes	Undecided.	No. Loss of business space and livelihood. If project will push through, give enough lead time for affected parties so they can find another business location. Give them disturbance compensation and	Rent: P12,500.00 Net Income: P300,000/month 7 workers

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
					assistance to relocate business.	
	c) Furniture shop (200 sqm) Business owner: Terry	Started business in 2018	No. Owner not on site at the time of data gathering. Respondent: Maridel	No	No. Road is narrow. The project can follow a another alignment.	No data.
5. One floor, 7 unit, commercial space	a) Property owner: Noel Quililan	NA	No. Owner not on site at the time of data gathering.	NA	NA	NA
	b) Renter/Maternity Clinic Owner?	No data	Owner not on site at the time of data gathering. Respondent: clinic staff	Yes. Project will help ease traffic.	Yes. After our lease contract, Clinic will transfer to space beside Alfamart.	Rent: P22,000/month Gross income: P100,000/month 4 workers
	c) Dress Shop	No data	No interview	NA	NA	NA
	d) Renter/Furniture Shop (20sqm) Business owner: Warlito dela Cruz	2011 originally owned by Noel Castro	Yes	Yes. Additional road infrastructure; Fast means of transportation	Yes. We can transfer to another business location.	Rent: P9,000/month Gross sales: P25,000/month 2 workers
	e) Renter: Optical Shop	No data	No interview	NA	NA	NA
	f) Renter/Raztapahan	No data	No interview	NA	NA	NA
	g) Gated parking space	No data	No interview	NA	NA	NA
6.450 sqm property with commercial spaces	a) property owner: Unknown	NA	No. Owner not on site at the time of data gathering	NA	NA	NA
	b. Renter: TW8 Hardware and Construction Materials Business Owner: Johnny Navarrete	Started business in 2007	No. Owner not on site at the time of data gathering Respondent was Andrew Eludela	Yes. Project will ease traffic	Yes. No choice because it is a government project.	Rent: P35,000/month Gross sales: P30,000/day 5 workers Business can be moved to another location

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
7.5,000-7,000 sqm property with 8 unit apartment7 (one was unoccupied) and 2 micro commercial space	a) Property owner: unknown	NA	No. Owner not on site at the time of data gathering	NA	NA	NA
	b) Renter/BBSL Store (20 sqm) Business owner: Anita Cabalea	March 2019	Yes	Can't answer	Can't answer. It is up to the owner. Big issue at the time of road widening. DPWH did not pay land owner. If negotiation and price of land is ok, the owner could agree to the project. Only the Villars do property development in the area. They buy land at a very low price (barat)	Rent: P12,000/month They can transfer business to a new location.
	c) Renter/Mikroma Digital Printing (15 sqm) Business owner: Remigio Soriano	Started business in 2016	No. Respondent was Shop attendant: Jimmy	Yes. It will ease traffic. Worthwhile government project	No. Roads are narrow so houses will be affected. "kawawa sila." Remedy is to provide relocation and compensation to affected property owners	Rent: P12,000 Sales: P3-4,000/day 2 workers
8. Property with 3 door apartment with commercial spaces	a) Property owner: unknown	NA	No. Owner not on site at the time of data gathering	NA	NA	NA
	b) Renter/Dalus Tailoring (10 sqm) Business owner:Linda	March 2019	No. Owner not onsite at the time of data gathering Respondent: Cathy (sewer)	Yes. To Progress. Fast means of transportation	No. Negative effect on business. Jeeps and vans will earn less. Project can find a different alignment.	Rent: P6000/month Gross sales: P1000/day
	h) Renter: Rocky Road's Eatery (25-30 sqm) Business owner: Rodel Hormepillo	Started business in 2017	No. Owner not on site at the time of data gathering. Respondent was:	Yes. Project will provide quick means of transportation	Can't answer. But business owner will be sad as he will have to find another business location.	Rent: P12,000/month Gross sales: P3,000/day

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
			Dino Salvador. Kitchen staff			
Subtotal	**8 property owners (5 residential/commercial and 3 purely commercial) 17 commercial renters 10 renters of residential apartments (not interviewed)**		**No property owners were interviewed. 12 renters/ representatives were interviewed; 5 were either closed or refused to be interviewed.**	**Yes -9 Can't answer/undecided - 2 No-1**	**Yes -5 Can't answer -2 Don't know- 1 No-4**	
Apollo Station, Along M. Alvarez, Barangay Talon 5, Las Pinas City						
1. McDonald's Branch	a) Property owner: Golden Arches Corp. 17th floor Citibank Tower, Paseo de Roxas Makati City	No data	No. Called office tel no 8888500 several times but no answer. Respondent was Alvin Arellano Department Manager on site	Yes, project is good in general	Can't answer for management.	
2. Phoenix Gas Station and Arman Works Auto Service Shop About 500 sqm	a) Property owner/General Manager: Rodelio Magarain	No data	No. Not on site during data gathering, Staff does not know exact address and telephone number of owner	NA	NA	NA
3. ROH Wheels Corporation 1.5 hectares, with vacant space in front of gate	a) Property and Business GM Rolex Lim	Business started in 1974	No. Not on site during data gathering. Responded on the phone: Nick Caluya Operations Head Tel no. 8011117	Yes, in general for as long as entrance is not blocked. Company has several trucks and containers Standard Height clearance of LRT is ok	Can't answer for management especially if part of the property will be affected	

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
4. 170, sqm, 2 floor apartment with blue roof with an animal clinic on the ground floor	a) Property owner: Armando Villao Lyn Evangelista based in the US. Son of Dr. Evangelista Tel 09153583819	No data	No. Not on site at the time of data gathering	NA	NA	NA
	b) Renter/EV Dog and Cat Clinic Business owner: Dr. Marcelo	2007	Yes.	Yes. LRT will lessen traffic	No. If business will be affected.	Rent: P4,000/month
5.980 sqm lot with commercial structure (3 units)	a) Property owner: Renato Sunga based abroad	No data	No. Not on site at the time of data gathering	NA	NA	NA
	b) Renter: Metal Fabrication shop	No data	Respondent: Ramon Salazar	Can't answer	Can't answer	Rent' P10,500/month
	c) Renter: CID Motorcycle Shop	No data	Respondent: Joseph Jolarbal	Can't answer	Can't answer	Rent: P11,200/month
	d) Brent Gas	No data	Respondent: William Tan	Can't answer	Can't answer	P11,000.month
6.Residential property with two commercial units	a) Property owner: Editha de Guzman (in Canada) Occupant is Cesar de Guzman Jr.	1970	No. Respondent: Cesar de Guzman Jr.	Can't answer	Can't answer	No data
	b) Renter/Dolor's Pansit	No data	No	NA	NA	NA
	c) Ways signage and T-shirt printing	No data	No	NA	NA	NA
7 181 sqm residential property with commercial units.	a) Property owner: Roderick Tanghal (from Malabon)	No data	No	NA	NA	NA
	b) Caretaker: Ester Palomares	No data	No. Refused to be interviewed as	NA	NA	NA

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
			she is not the owner			
	c) Renter: Beauty Salon	No data	No. Refused to be interviewed	NA	NA	NA
8 Residential property with green gate and commercial units	a) Property owner: Mrs. Ulep	1970	Yes	Yes. In general.	No. We will lose our ancestral home. Find a different alignment where the road is wider	NA
	b) Renter/Six Kings Paint Commercial Business owner: Sherlyn Francisco	No data	No. Owner was busy and was not interviewed. Respondent: Danny (staff)	Yes. Project will shorten travel time, Ex. From 4 hours to Gen Trias to 30 mins. It is ease traffic	Yes. Commute will be easier.	2 workers
	c) Renter/Bicycle Shop 20-30 sqm Business owner: May Gold	Started business in May 2018	Yes	Yes. Project will ease traffic and shorten travel time	No. Business/Livelihood will be affected. Other commercial spaces are expensive.	Rent P6000/month Income: P20,000/month From Tanza; family lives in the shop.
9 Commercial space	a) Property owner: Jaime Villano	No data	No	NA	NA	NA
	b) Renter/JNF Internet Cafe (60 sqm and 18 computer units)	2016	No. Owner not on site at the time of data gathering. Respondent: Kim Frances (staff)	Yes. Project will help commuters	No. Business space will be affected by road widening to accommodate the LRT	Rent: No data Gross sales: P2,500/day 2 workers
	c) Renter/electronics repair shop (15 sqm) Business owner: Jaime Villano	1999 (20 years)	No. Owner no on site at the time of data gathering Respondent: Mar Labanan (staff)	Yes. Project will ease traffic. and shorten travel time.	Yes. Citizens cannot go against government projects	Rent: P3,500 Gross sales: P1000/day
	c) QualiPure Water Refilling station	2018	No. Owner not on site at the time of data gathering Respondent: Manuel (staff)	Yes. Project will reduce traffic.	Can't answer. Depends on business and property owner	Rent: no data Gross sales: P4,000/day 2 workers

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
10 Commercial space	Good All Day Trading	No data	Refused interview	No data	No data	No data
Subtotal	**10 properties (5 residential with commercial units and 5 purely commercial structures) 10 property owners 12 renters/business owners**		**13 respondents representing business or property owners 4 refused to be interviewed 5 were not available for interview**	**Yes: 9 No: none Can't answer: 4 No data**	**Yes: 2 No: 4 Can't answer: 7**	
Canaynay-Tionquiao Curve, Barangays Talon Uno and Manuyo Dos, Las Piñas City						
1. 100 sqm two-floor residential with commericial units, garage and small vacant lot (their property is part of Martin Ville subdivision	a) Property owner: Vicky Malakas, 82 years old	1982	No. She was sleeping at the time of data gathering. Respondent: Virgilio Malakas, son	No. We have no traffic problem here.	No. Especially if road widening will happen again. Our property has repeatedly decreased in area because of two previous road widening activities. Nothing will be left of our property, We have no other place to go. Owner is old.	'
	b) Renter/Small tailoring shop (6 sqm) Business owner: Emerlito Garcia	No data	No	NA	NA	NA
	c) Laundry shop Business Owner: Vicky Malakas	No data	No. Respondent: Virgilio Malakas	No. We have no traffic problem here	No. We are tired of road widening eating up our property	Gross sales: P20,000/month
	d) Renter; Junkshop	No data	No. Closed at the time of data gathering	NA	NA	NA
2. 100 sq m one floor residential property (also part of MatrinVille Subdivision)	a) Property owner: Minda Malakas	1982	No. Closed at the time of data gathering.	NA	NA	NA

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
3. 100 sqm one level Commercial property	a) Property owner: Gamaliel Geron (from Martinville)	No data	No. Owner not on site at the time of data gathering	NA	NA	NA
	b) Renter:Will Grace Trading 100 sqm hardware shop Business owner: Wildrin Villas	2014	No. Not on site at the time of data gathering Respondent: Enrique Villas (brother)	Yes. The project is good.	Can't answer for the property and business owners. Proper Talks between proponent and owners can have win-win results	Rent:P22,000/month 8 workers who are paid P400/day
4. 334 sqm lot with two floor concrete commercial structure with Smart Tower at the 3rd floor, 5 units for rent. (two lots: 130 sqm and 204 sqm)	a) Property Owner: Maribel Francisco (daughter) b) Business owner: Romar Farms Enterprises Respondent: Ben Roberto	Bought property and started business in the 1980s	Yes	Yes. Project is part of the country and city's progress and development. It will be for the benefit of the people.	Yes. Even if we have to sacrifice part of our property. Affected property owners should be properly compensated. We already experienced road widening in the past where government implemented the required 5-meter setback. We remain unpaid.	Net income: P200,000/month 20 workers Going rate:P30,000/sqm
5. 40 sqm small commercial property	a) Property owner: unknown	No data	No. Not on site at the time of data gathering	NA	NA	NA
	b) Renter/Joan's Store and Carinderia Business owner: Nelda	Started business in 2014	Yes.	Yes. Project will benefit commuters.	No. Livelihood will be affected. It is difficult to find a profitable business location. Proponent should follow another alignment. There are vacant areas in Paranaque which can be used.	Rent: P5000/month Gross sales: P5000/day Family lives in the business location
	c) Nate Pro Serna	No data	Closed at the time of data gathering	NA	NA	NA
	d) Nonoy vulcanizing	No data	Closed at the time of data gathering	NA	NA	NA
6. 30 sqm commercial space	Regan Junkshop	Acquired rights in 2011 for PP30,000.	Yes	Can't answer	No. Space and livelihood will be lost.	Gross sales: P 1,500 to P2,000/day

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
	Holder of rights from Luciana Pasinabog Business owner: Daisy Encio					Informal settler in CAA Phase 5
7. 30-40 sqm commercial space	AB Quilala Junkshop Business owner: Charlie Masirabo	March 2018	No. Owner not on site at the time of data gathering Respondent: Marlon	Yes. Because it is government project. It is a fast means of transportation	Yes. We can't go against a government project	Gross Sales:P2,000/day 10 people live in the business space
8. Pericon Building (3 floors with 5 commercial spaces; 2nd and 3rd floors are rental spaces)	a) Property owner: Mr. Pericon	No data	No. Owner not on site at the time of data gathering	NA	NA	Na
	b) Renter of second floor/Verbo of God Christian Church	No data	No. Closed at the time of data gathering	NA	NA	NA
	c) Renter of third floor/Church of Jesus Christ	No data	No. Closed at the time of data gathering	NA	NA	NA
	d) Renter/First Corinthian Appliance Services (20-30 sqm for office and about 20 sqm for display area) Business owner: Elvis Arguelles	Business started in 2014	No. Owner not on site at the time of data gathering Respondent: Diane/ Pacita (staff)	Yes. Convenient and fast transportation for workers travelling from north to south and vice versa	No. If via CAA road. Many will lose their homes and businesses. LRT alignments should not pass through residential areas. Where will displaces families be relocated	Rent; P11,000month Gross income: P70-90,000/month 11-20 workers. Some are on call basis/
	e) Renter/Coolmade Radiator Services	Business stated 2016	No. Owner not on site at the time of data gathering Respondent: Jomar (staff)	Don't know	Yes. People can't go against government projects	No data
	f) Emblem Auto Repair Shop (15-20 sqm)	Business started in 2016	No. Owner not on site at the time of data gathering.	Yes. Project will ease traffic and make travel faster,	Yes. People can't go against government projects.	Rent: P12,000/month Gross income: P30,000/month

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
	Business Owner: Erwin dela Cruz		Respondent: JJ (staff)			3 workers
	g) Renter: Alboro Auto Accessories (15 sqm) Business owner: Salvacion Alboro	Business started in 2012	Yes	Yes. Project will ease traffic and make travel faster. But surely, during construction it will cause inconvenience to business and customers	Yes. We can't stop government projects. Proper consultation and talks should take place to see what is best for affected parties	Rent: PP11,000/month Income : P50,000/month Family members help man the business
	h) Canteen	No data	Closed at the time of data gathering	NA	NA	NA
9. 700 sqm commercial property	a) Property/Business owner: Rolando Tanaleon (US based) 4S Cargo Services	Business stated 2008 Chose location because of proximity to the airport and pier.	No. Owner not on site at the time of data gathering. Respondent: Stella Saballa (staff)	Yes. Project will ease traffic .	Yes. We cannot stop government projects. But if possible, please spare our area from the alignment. Proper negotiation between proponent and affected parties should be done.	25 workers including truck drivers.
10. 100 sqm commercial space Second floor was built without city government permit (part of 8 hectare property which was subdivided)	a) Rights holder: Lizel Licerna Heavy Equipment Buy and sell business	1999 (20 years)	Yes.	Yes. Project will ease traffic. Convenient and fast means of transportation.	Yes. Because it is a government project.	Income: P200,000/month 15 workers who also sleep in the shop
11. 100 sqm commercial/residential space	a) Rights holder: Roselyn Solatorio Water seller	2008 (11 years)	Yes	Yes. Fast and convenient means of transportation. Negative effect: loss of livelihood of affected parties	Yes. Because we cannot stop government projects. Hopefully, proponent or government will buy our occupancy right.	Net Income: P3000/month Family of 7 (with old parents) lives here.
Subtotal	**11 properties (8 purely commercial; 1 purely residential; and 2residential/ commercial) 8property owners 3 Rights holders 13 renters/ business owners**		**3 property owners, 3 rights holders, and 8 renters/ business owners were interviewed. 5 rented business establishments were closed during the survey.**	**Yes: 10 No: 2 Can't answer: 1 Don't know: 1**	**Yes:8 No:5 Can't answer:1**	

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
Corner Alabang Zapote Road and M. Alvarez Curve, Barangay Talon Uno and Manuyo Dos, Las Piñas City						
1. 300 sqm new two level commercial complex (16 stalls) With 65 m easement from 1.5 road shoulder	a) Property and Business Owner: Widen King Moonwalk Food and Events Place	About to be completed April 2019	No. Owner not on site at the time of data gathering. Respondent: Project Engr. Francisco Oril	Can't answer	Can't answer	
2. One unit/one floor commercial space (fruit store (20-25 sqm)	a) Property owner: No data	No data	No. Owner not on site at the time of data gathering. .	NA	NA	NA
	b) Business owner: No data	No data	Sales staff refused to be interviewed	NA	NA	NA
3. One room/one floor commercial space (20-25 sqm) 3 renters: fruit stall, Sari-sari store, and Pera Padala Ate Pilar is the rent collector	a) Property owner: No data	No data	No. Owner not on site at the time of data gathering	NA	NA	NA
	b) Renter: Fruit stall Business owner: no data	2000	No. Business owner not on site at the time of data gathering Respondent: sales staff	Can't answer	Can't answer	Rent: No data
	c) Sari-sari store	2000	Respondent: Sales person	Can't answer	Can't answer. If our business space and livelihood is affected. Can the project allot some space for micro business owners	Rent:P4,500/month Family of 3 lives in the space
	d. Pera Padala Shop	2000	Respondent: Staff	Can't answer	Can't answer	Rent: No data
4. 20-25 qm One room/one floor commercial space with 4 renters: Cellphone	a) Property owner: No data	No data	No. Owner not on site at the time of data gathering	NA	NA	NA

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
accessory shop, variety store (2 spaces), glass and kitchen ware						
	b) Renter/Cellphone Accessory Shop	Don't know	No. Business owner not on site at the time of data gathering Respondent: Angelie Ayala (sales staff)	Yes. Project will provide fast and convenient means of transportation. Negative impacts: Loss of property, business, income of workers	Can't answer. But project should be done without causing difficulty to affected parties	Rent: P7500/month Wage: P200-400/day
	c) Renter: Glass ware and Kitchenware shop	NA	Refused to be interviewed.	No data	No data	No data
5. 3-floor commercial building 2nd and 3rd floors are vacant	a) Property owner: Mr Ignacio	No data	No. Owner not on site at the time of data gathering.	No data	No data	No data
	b) Renter: Medipharma (30 sqm) Business owner: Jane Lim	2011	No. Owner not on site st the time of data gathering Respondent:: Rosemarie Rotines	Yes. Travel will be faster	No. Lost space, no business, no job for workers	Gross sales; P20,000/day 4 workers
6. Two floor commercial building	a) Property Owner: Efren King	No data	No. Owner not on site at the time of data gathering	No data	No data	No data
	b) Renter/Nicks Cellphone Loading and Accessories Business Owner: Thelma Son	Started renting in 2000 (19 years)	Yes.	No. Especially if it will affect my business space and livelihood. I have no other means of living	No. Project will cause loss of livelihood. I have children to support. If project will push through, out prayer is that the proponent and the government will	
7. Two floor commercial building with 3 renters/dry goods stores; and second	a) Property Owner: no data	No data	No. Owner not on site at the time of data gathering	No data	No data	No data

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
floor with 18 rooms for rent.						
	b) renter/dry goods store	No data	No. Owner not on site at the time of data gathering	No data	No data	No data
	c) Renter/dry goods store	No data	No. Owner not on site at the time of data gathering	No data	No data	No data
	d) Renter/dry goods store	No data	No. Owner not on site at the time of data gathering	No data	No data	No data
8. Commercial building	a) Property owner: Roan Malapajo	No data	No. Owner not on site at the time of data gathering	No data	No data	No data
	b) Renter/Rice Wholesaler and Retailer Business owner: Elmer Sadaba	2019	Yes	Yes. Part of progress	Yes	Rent: P400/day Gross sales: P150,000/month From Gen Trias Cavite
9. Commercial Building	a) Property owner: Efren King	No data	No. Owner not on site at the time of data gathering	No data	No data	No data
	b) Renter/Dunkin Donuts (30 sqm) Business owner: Pilar	Started renting in 1999 (20 years)	No. Owner not on site at the time of data gathering. Respondent: Jomer Ponsaran (Crew)	Yes. Project will reduce travel time of commuters.	Personally Yes, Can't answer for property and business owner	Rent: P20,000/month Gross sales: P15,000.day 3 workers
	c) Renter/Dry goods store (30 sqm) Business owner: Emma Sarim (from Marawi)	Started renting 2011 (8 years)	Yes	Yes. Project will help improve traffic	No. Loss of business space and loss of livelihood. I have children that I need to send to school. If project will push through, the proponent/government should find a place for micro business owners.	Rent:P200/day Gross sales: P3,000/day 3 workers

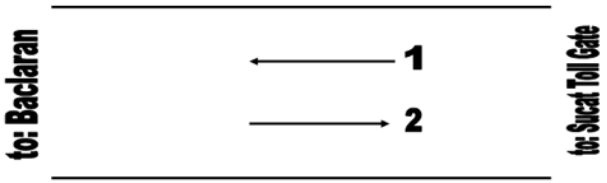
Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
10. Small Commercial structure	a) Property owner: Aquilino Gupit	No data	No. Owner not on site at the time of data gathering	No data	No data	No data
	b) Renter/Barber shop and dry good s store (25 sqm)	Started renting in 2014 (5 years)	Yes	Yes. Project will provide fast means of transportation	Yes. We cannot go against government projects. It will affect our business space and livelihood.	Rent: P20,000/month Gross sales: P4,000/day
11. Flea Market (2 floor building) With 40 stalls and 16 room dormitory for vendors	a) Property Owner: Gloria Sanchez (wife of Brgy. Capt. Pogi Sanchez)	No data	No. Owner not on site at the time of interview	NA	NA	NA
	b) Stall 1/ Carinderia Business owner: Emy Kiongco (10 sqm)	Started renting in 1989 (30 years)	Yes	Yes	It depends on the market owner. If owner agrees, we cannot do anything It will be difficult to find another business space. Suki Market	Rent: P300/day or P9,000/month Net income: P30,000/month 2 workers. Difficult to transfer to Suki Market because required advance payment is 7 times the monthly rental. (P63,000)
	c) Stall 2/Ryan and Mina Fresh Chicken and Meat Store	Started renting in 1984 (35 years)	Yes	Yes	It depends on the market owner. If owner agrees, we cannot do anything	Rent: P2,700/day or P81,000/month Gross sales: P50,000/day
	d) Stall 3/Fish store	No data	Yes	Yes	It depends on the owner. If owner agrees, we cannot do anything.	Rent:: P1,500/day or P45,000/month Gross sales: P10,000/day
	e) Stall 4/Tilapia store	Started renting in 2017	Yes	Yes	It depends on the owner.. If owner agrees, we cannot do anything.	Rent P1,200/day or P36,000/month Gross sales: P7,000/day

Identified Potentially affected Structures	Potentially affected persons/occupants	Ownership/Lease History	Interviewed during survey	Attitude towards the project in general	Attitude towards the project if owned/leased property is affected	Additional Information
	f) Stall 5/Bangus Store	Started renting in 2004 (15 years)	Yes	Yes	It depends on the owner, If owner agrees, we cannot do anything.	Rent: P1,300/day Gross sales: P10,000/day
	g) Stall 6/Fruits store	Started renting in 1984 (35 years)	Yes	Yes	It depends on the owner, If owner agrees we cannot do anything.	P1,200/day or P36,000/month Gross sales: P11,000/day
Subtotal	**11 commercial property owners 22business owners**		**1 representative of property owners interviewed. 22 renters/business owners were approached for interview.**	**Yes: 14 No.1 Can't answer: 4 Refused interview or No one available for interview: 4**	**Yes:3 No:3 Can't answer Or It depends on the owner: 13 Refused interview or no one available for interview: 4**	**r**
CAA Tricycle Terminal	347 tricycle drivers	a) Property owner: Empalico Homes, Inc. through the Empalico Livelihood Project & Tricycle Terminal along J. Aguilar Avenue in Pamplona Tres, Las Pinas City C/o Mrs. Tobias	No. Respondent: a tricycle owner/driver tricycle with body no. CCTODA 065	Yes	It is up to the owner	Tricycle drivers who park their vehicles pay a daily fee of P10. Tricycle drivers earn P600-700 per day gross. Several stalls also operated in the terminal.
Liana's Supermarket complex It houses Jollibee, Mang Inasa;, the supermarket, the department store, basement parking area, and about 30 retail stalls.	No data	No data	No interview	NA	NA	NA

APPENDIX 19. TRAFFIC SURVEY DATA FOR THE LRT LINE-6A AND LINE-6B+C PROJECT

Station 1 (SM Sucat)

Stn._01_SM_Sucat



Road	Dr A. Santos Avenue
Section	SM Sucat
Direction	1
Date	10-Apr-19

Hourly Summaries

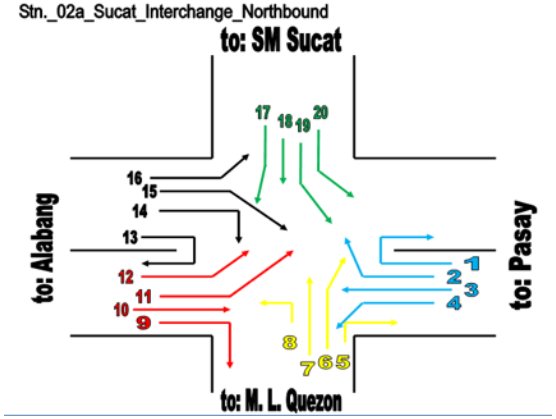
Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	635	640	745	1	100	200	13	48	0	0	0	63
7:00 - 8:00	605	615	600	0	85	96	4	50	0	0	0	109
8:00 - 9:00	426	349	408	0	114	69	1	6	0	1	0	78
9:00 - 10:00	340	301	333	0	70	143	0	11	0	0	0	110
10:00 - 11:00	140	66	117	0	46	46	0	0	0	0	0	48
11:00 - 12:00	415	355	414	26	145	174	12	23	17	9	5	96
12:00 - 13:00	396	259	357	17	65	96	3	16	6	2	2	64
13:00 - 14:00	275	141	236	13	37	64	0	17	6	3	3	74
14:00 - 15:00	390	321	358	13	77	81	0	35	5	6	5	143
15:00 - 16:00	428	258	316	6	78	119	3	30	14	8	4	122
16:00 - 17:00	233	183	198	7	142	137	4	47	1	1	1	70
17:00 - 18:00	258	122	185	8	77	92	5	46	3	1	4	84
18:00 - 19:00	321	335	338	17	248	217	5	12	0	0	1	39
19:00 - 20:00	182	178	164	5	91	136	1	12	0	0	0	39
20:00 - 21:00	169	117	102	1	73	63	6	7	13	4	7	15
21:00 - 22:00	100	74	96	1	47	38	5	3	4	1	0	22
16hr Total	**5313**	**4314**	**4967**	**115**	**1495**	**1771**	**62**	**363**	**69**	**36**	**32**	**1176**

Road	Dr A. Santos Avenue
Section	SM Sucat
Direction	2
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	203	300	310	4	152	213	7	6	0	3	0	162
7:00 - 8:00	196	287	330	8	120	230	1	5	0	0	0	180
8:00 - 9:00	211	233	364	15	36	97	6	19	6	4	0	179
9:00 - 10:00	136	219	246	13	20	87	5	17	3	4	0	80
10:00 - 11:00	245	247	209	9	29	76	2	11	18	1	3	87
11:00 - 12:00	146	263	187	4	135	177	2	9	4	0	0	124
12:00 - 13:00	240	267	214	5	63	112	6	11	12	2	3	126
13:00 - 14:00	125	215	223	2	141	151	2	5	0	1	0	107
14:00 - 15:00	236	255	255	2	170	170	1	33	10	4	0	138
15:00 - 16:00	217	225	239	3	87	176	4	4	1	0	0	145
16:00 - 17:00	258	245	314	9	117	199	3	18	6	3	0	162
17:00 - 18:00	266	228	269	15	102	122	2	5	3	0	0	191
18:00 - 19:00	187	259	254	5	79	97	2	10	2	0	1	91
19:00 - 20:00	180	208	157	2	99	124	2	1	1	0	0	83
20:00 - 21:00	148	250	161	1	176	175	1	2	0	3	1	273
21:00 - 22:00	135	223	162	0	161	124	0	8	0	2	0	52
16hr Total	**3129**	**3924**	**3894**	**97**	**1687**	**2330**	**46**	**164**	**66**	**27**	**8**	**2180**

Station 2 (Sucat Interchange)



Road	Sucat Interchange NB
Section	
Direction	1
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	25	0	0	0	0	0	0	5	0	0	0	3
7:00 - 8:00	39	0	0	0	0	0	0	6	0	0	0	3
8:00 - 9:00	119	0	0	0	1	0	0	16	0	0	0	2
9:00 - 10:00	98	0	0	0	1	0	0	11	1	0	0	5
10:00 - 11:00	79	0	0	0	1	0	0	14	1	0	0	7
11:00 - 12:00	79	0	0	0	0	0	0	21	2	0	0	8
12:00 - 13:00	48	0	0	0	0	0	0	16	2	0	0	2
13:00 - 14:00	76	0	0	0	1	0	0	14	2	0	0	7
14:00 - 15:00	75	0	0	0	2	0	0	14	2	0	0	5
15:00 - 16:00	68	0	0	0	1	0	0	12	2	0	0	4
16:00 - 17:00	61	0	0	0	0	0	0	11	0	0	0	5
17:00 - 18:00	82	0	0	0	0	0	0	6	0	0	0	4
18:00 - 19:00	56	0	0	0	0	0	0	8	0	0	0	3
19:00 - 20:00	50	0	0	0	0	0	0	4	0	0	0	1
20:00 - 21:00	47	0	0	0	0	0	0	8	1	0	0	4
21:00 - 22:00	47	0	0	0	0	0	0	2	0	0	0	3
16hr Total	**1049**	**0**	**0**	**0**	**7**	**0**	**0**	**168**	**13**	**0**	**0**	**66**

Road	Sucat Interchange NB
Section	0
Direction	2
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	53	28	206	0	0	0	0	7	0	0	0	9
7:00 - 8:00	80	28	201	0	0	0	0	9	0	1	1	10
8:00 - 9:00	245	48	343	0	3	2	0	22	0	0	0	8
9:00 - 10:00	204	38	289	0	4	2	0	15	6	4	0	18
10:00 - 11:00	162	46	228	0	4	1	0	19	7	3	5	19
11:00 - 12:00	161	39	189	0	3	2	0	27	11	3	1	20
12:00 - 13:00	99	30	168	0	3	0	0	22	9	5	2	6
13:00 - 14:00	158	31	206	0	5	2	0	19	12	3	0	24
14:00 - 15:00	153	27	203	0	6	1	0	20	7	3	1	15
15:00 - 16:00	139	34	201	0	5	0	0	17	9	0	3	15
16:00 - 17:00	125	34	196	0	2	0	0	15	3	0	1	14
17:00 - 18:00	167	44	380	0	3	2	0	10	2	1	1	8
18:00 - 19:00	116	34	431	0	1	0	0	12	1	2	0	8
19:00 - 20:00	103	38	452	0	1	0	0	5	3	1	0	5
20:00 - 21:00	96	59	273	0	1	0	0	11	5	0	2	10
21:00 - 22:00	96	55	231	0	0	0	0	5	1	5	4	10
16hr Total	**2157**	**613**	**4197**	**0**	**41**	**12**	**0**	**235**	**76**	**31**	**21**	**199**

Road	Sucat Interchange NB
Section	0
Direction	3
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	4	27	301	0	0	0	0	0	0	0	0	2
7:00 - 8:00	7	26	296	0	0	0	0	0	0	0	0	3
8:00 - 9:00	20	45	502	1	1	0	0	0	0	0	0	2
9:00 - 10:00	17	34	424	0	1	0	0	0	0	2	0	5
10:00 - 11:00	14	42	334	0	1	0	0	0	0	1	0	5
11:00 - 12:00	14	37	276	1	0	0	0	0	0	0	0	5
12:00 - 13:00	8	29	245	1	0	0	0	0	0	1	0	2
13:00 - 14:00	14	29	301	3	1	0	0	0	0	1	0	7
14:00 - 15:00	12	25	296	2	2	0	0	0	0	1	0	5
15:00 - 16:00	11	32	292	3	1	0	0	0	0	0	0	4
16:00 - 17:00	11	31	286	1	0	0	0	0	0	0	0	4
17:00 - 18:00	14	40	554	0	0	0	0	0	0	0	0	4
18:00 - 19:00	10	31	628	0	0	0	0	0	0	0	0	3
19:00 - 20:00	8	36	661	0	0	0	0	0	0	0	0	1
20:00 - 21:00	9	54	398	1	0	0	0	0	0	0	0	3
21:00 - 22:00	8	52	338	0	0	0	0	0	0	1	0	3
16hr Total	**181**	**570**	**6132**	**13**	**7**	**0**	**0**	**0**	**0**	**7**	**0**	**58**

Road	Sucat Interchange NB
Section	0
Direction	4
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	4	4	33	0	0	0	0	1	0	0	0	0
7:00 - 8:00	4	2	33	0	0	0	0	2	0	0	0	0
8:00 - 9:00	14	5	57	1	0	0	0	6	0	0	0	0
9:00 - 10:00	12	4	48	2	0	0	0	4	0	0	0	0
10:00 - 11:00	9	5	38	0	0	0	0	4	0	0	0	0
11:00 - 12:00	9	4	32	3	0	0	0	7	0	0	0	0
12:00 - 13:00	5	4	28	2	0	0	0	6	0	0	0	0
13:00 - 14:00	8	4	35	5	0	0	0	5	0	0	0	0
14:00 - 15:00	9	4	34	4	0	0	0	4	0	0	0	0
15:00 - 16:00	8	4	33	4	0	0	0	4	0	0	0	0
16:00 - 17:00	8	4	32	2	0	0	0	3	0	0	0	0
17:00 - 18:00	10	4	63	1	0	0	0	2	0	0	0	0
18:00 - 19:00	6	4	71	0	0	0	0	3	0	0	0	0
19:00 - 20:00	5	4	74	0	0	0	0	1	0	0	0	0
20:00 - 21:00	5	6	45	2	0	0	0	3	0	0	0	0
21:00 - 22:00	4	7	38	0	0	0	0	0	0	0	0	0
16hr Total	**120**	**69**	**694**	**26**	**0**	**0**	**0**	**55**	**0**	**0**	**0**	**0**

Road	Sucat Interchange NB
Section	0
Direction	5
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	4	0	16	0	0	0	0	0	0	0	0	0
7:00 - 8:00	3	0	29	0	0	0	0	0	0	0	0	0
8:00 - 9:00	4	0	36	0	0	0	0	0	0	0	0	0
9:00 - 10:00	3	0	24	0	0	0	0	0	0	0	0	0
10:00 - 11:00	3	0	23	0	0	0	0	0	0	0	0	0
11:00 - 12:00	4	0	22	0	0	0	0	0	0	0	0	0
12:00 - 13:00	4	0	23	0	0	0	0	0	0	0	0	0
13:00 - 14:00	1	0	13	0	0	0	0	0	0	0	0	0
14:00 - 15:00	0	0	9	0	0	0	0	0	0	0	0	0
15:00 - 16:00	2	0	8	0	0	0	0	0	0	0	0	0
16:00 - 17:00	1	0	11	0	0	0	0	0	0	0	0	0
17:00 - 18:00	3	0	22	0	0	0	0	0	0	0	0	0
18:00 - 19:00	1	0	16	0	0	0	0	0	0	0	0	0
19:00 - 20:00	1	0	20	0	0	0	0	0	0	0	0	0
20:00 - 21:00	1	0	15	0	0	0	0	0	0	0	0	0
21:00 - 22:00	0	0	18	0	0	0	0	0	0	0	0	0
16hr Total	**35**	**0**	**305**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Road	Sucat Interchange NB
Section	0
Direction	6
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	78	52	25	0	0	0	0	2	0	0	0	3
7:00 - 8:00	66	77	45	0	4	0	0	1	0	0	0	7
8:00 - 9:00	90	104	55	0	1	0	0	11	0	1	0	8
9:00 - 10:00	81	86	37	0	1	0	0	27	1	2	0	7
10:00 - 11:00	71	72	35	0	3	0	0	30	0	2	0	8
11:00 - 12:00	76	84	34	0	2	0	0	15	1	0	0	3
12:00 - 13:00	66	77	35	0	0	0	0	24	4	0	0	8
13:00 - 14:00	45	64	19	0	2	0	0	18	1	3	0	5
14:00 - 15:00	34	81	11	0	5	0	0	26	3	0	0	5
15:00 - 16:00	49	95	12	0	6	0	0	9	1	0	0	5
16:00 - 17:00	47	96	16	0	2	0	1	8	0	1	0	5
17:00 - 18:00	54	86	33	0	2	0	0	17	1	1	0	2
18:00 - 19:00	36	70	25	0	2	0	0	7	0	1	0	4
19:00 - 20:00	52	76	29	0	4	0	0	7	0	1	0	2
20:00 - 21:00	43	94	22	0	3	0	0	16	3	1	0	4
21:00 - 22:00	32	63	28	0	4	0	0	7	1	1	0	0
16hr Total	**920**	**1277**	**461**	**0**	**41**	**0**	**1**	**225**	**16**	**14**	**0**	**76**

Road	Sucat Interchange NB
Section	0
Direction	7
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	7	0	0	0	0	0	0	0	0	0	0	1
7:00 - 8:00	7	2	0	0	0	0	1	0	0	0	0	2
8:00 - 9:00	9	4	0	0	0	0	1	0	0	0	0	4
9:00 - 10:00	8	2	0	0	0	0	1	0	0	0	0	1
10:00 - 11:00	7	1	0	0	0	0	0	0	0	0	0	4
11:00 - 12:00	8	2	0	0	0	0	0	0	0	0	0	0
12:00 - 13:00	7	2	0	0	0	0	0	0	0	0	0	2
13:00 - 14:00	5	0	0	0	0	0	3	0	0	0	0	1
14:00 - 15:00	4	2	0	0	0	0	0	0	0	0	0	2
15:00 - 16:00	5	3	0	0	0	0	0	0	0	0	0	1
16:00 - 17:00	5	3	0	0	0	0	1	0	0	0	0	1
17:00 - 18:00	6	3	0	0	0	0	0	0	0	0	0	0
18:00 - 19:00	4	0	0	0	0	0	1	0	0	0	0	0
19:00 - 20:00	5	1	0	0	0	0	1	0	0	0	0	0
20:00 - 21:00	5	2	0	0	0	0	2	0	0	0	0	0
21:00 - 22:00	3	0	0	0	0	0	0	0	0	0	0	0
16hr Total	**95**	**27**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**19**

Road	Sucat Interchange NB
Section	0
Direction	8
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	15	10	12	0	0	0	0	0	0	0	0	1
7:00 - 8:00	12	15	23	1	0	0	0	0	0	0	0	2
8:00 - 9:00	16	21	29	5	0	0	0	0	0	0	0	4
9:00 - 10:00	14	17	17	2	0	0	0	0	0	0	0	1
10:00 - 11:00	13	14	18	2	0	0	0	0	0	0	0	4
11:00 - 12:00	14	16	18	0	0	0	0	0	0	0	0	0
12:00 - 13:00	13	14	18	1	0	0	0	0	0	0	0	2
13:00 - 14:00	8	12	10	1	0	0	0	0	0	0	0	1
14:00 - 15:00	7	15	6	2	0	0	0	0	0	0	0	2
15:00 - 16:00	8	18	5	6	0	0	0	0	0	0	0	1
16:00 - 17:00	9	19	9	2	0	0	0	0	0	0	0	1
17:00 - 18:00	11	16	16	4	0	0	0	0	0	0	0	0
18:00 - 19:00	7	14	13	0	0	0	0	0	0	0	0	0
19:00 - 20:00	9	15	15	2	0	0	0	0	0	0	0	0
20:00 - 21:00	8	18	11	1	0	0	0	0	0	0	0	0
21:00 - 22:00	5	12	14	1	0	0	0	0	0	0	0	0
16hr Total	**169**	**246**	**234**	**30**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**

Road	Sucat Interchange NB
Section	0
Direction	9
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	11	16	14	0	0	0	0	0	0	0	0	0
7:00 - 8:00	16	33	43	1	0	0	0	0	0	0	0	0
8:00 - 9:00	13	32	38	1	0	0	0	0	0	0	0	0
9:00 - 10:00	12	29	28	4	0	0	0	0	0	0	0	0
10:00 - 11:00	14	27	22	1	0	0	0	0	0	0	0	0
11:00 - 12:00	13	24	18	6	0	0	0	0	0	0	0	0
12:00 - 13:00	11	19	14	2	0	0	0	0	0	0	0	0
13:00 - 14:00	16	18	27	3	0	0	0	0	0	0	0	0
14:00 - 15:00	19	34	30	7	0	0	0	0	0	0	0	0
15:00 - 16:00	15	31	23	3	0	0	0	0	0	0	0	0
16:00 - 17:00	19	21	24	4	0	0	0	0	0	0	0	0
17:00 - 18:00	22	22	30	2	0	0	0	0	0	0	0	0
18:00 - 19:00	21	22	29	1	0	0	0	0	0	0	0	0
19:00 - 20:00	17	23	37	1	0	0	0	0	0	0	0	0
20:00 - 21:00	11	20	28	1	0	0	0	0	0	0	0	0
21:00 - 22:00	8	16	18	3	0	0	0	0	0	0	0	0
16hr Total	**238**	**387**	**423**	**40**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Road	Sucat Interchange NB
Section	0
Direction	10
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	49	53	155	0	7	0	0	0	0	0	0	1
7:00 - 8:00	69	110	509	1	16	0	0	0	0	0	0	3
8:00 - 9:00	55	108	448	1	33	0	0	2	0	0	0	4
9:00 - 10:00	54	98	325	2	22	0	0	4	0	0	0	4
10:00 - 11:00	61	93	266	1	11	0	0	3	0	0	1	3
11:00 - 12:00	59	81	220	5	22	1	0	5	0	0	2	5
12:00 - 13:00	49	62	164	0	16	2	0	12	0	0	5	5
13:00 - 14:00	70	61	319	2	16	1	0	4	0	0	5	6
14:00 - 15:00	82	112	357	4	10	3	0	4	0	0	4	3
15:00 - 16:00	68	104	264	2	5	1	0	4	0	0	1	3
16:00 - 17:00	83	72	292	3	8	4	0	4	0	0	0	5
17:00 - 18:00	94	75	363	1	18	2	0	7	0	0	2	3
18:00 - 19:00	95	74	340	1	12	4	0	3	0	0	3	3
19:00 - 20:00	76	78	450	1	7	1	0	1	0	0	0	2
20:00 - 21:00	53	71	334	1	6	0	0	3	0	0	0	0
21:00 - 22:00	37	56	215	2	7	2	0	2	0	0	1	1
16hr Total	**1054**	**1308**	**5021**	**27**	**216**	**21**	**0**	**58**	**0**	**0**	**24**	**51**

Road	Sucat Interchange NB
Section	0
Direction	11
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	2	0	0	0	0	0	0	0	0	0	0	3
7:00 - 8:00	4	0	0	0	0	0	0	0	0	0	0	4
8:00 - 9:00	4	0	0	0	0	0	0	0	0	0	0	6
9:00 - 10:00	2	0	0	0	0	0	0	0	0	0	0	4
10:00 - 11:00	3	0	0	0	0	0	4	0	0	0	0	5
11:00 - 12:00	2	0	0	0	0	0	0	0	0	0	0	7
12:00 - 13:00	3	0	0	0	0	0	0	0	0	0	0	8
13:00 - 14:00	4	0	0	0	0	0	1	0	0	0	0	8
14:00 - 15:00	4	0	0	0	0	0	3	0	0	0	0	7
15:00 - 16:00	4	0	0	0	0	0	1	0	0	0	0	4
16:00 - 17:00	4	0	0	0	0	0	1	0	0	0	0	5
17:00 - 18:00	4	0	0	0	0	0	1	0	0	0	0	4
18:00 - 19:00	4	0	0	0	0	0	1	0	0	0	0	4
19:00 - 20:00	4	0	0	0	0	0	2	0	0	0	0	4
20:00 - 21:00	3	0	0	0	0	0	1	0	0	0	0	2
21:00 - 22:00	0	0	0	0	0	0	0	0	0	0	0	2
16hr Total	**51**	**0**	**0**	**0**	**0**	**0**	**15**	**0**	**0**	**0**	**0**	**77**

Road	Sucat Interchange NB
Section	0
Direction	12
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	96	15	56	0	4	0	0	0	0	0	0	19
7:00 - 8:00	135	31	184	0	8	0	0	1	0	0	0	35
8:00 - 9:00	109	30	161	0	16	0	0	5	0	0	0	47
9:00 - 10:00	107	27	118	0	11	0	0	9	0	0	0	30
10:00 - 11:00	121	26	96	0	5	0	0	7	0	1	0	37
11:00 - 12:00	115	22	78	0	11	1	0	13	0	4	0	53
12:00 - 13:00	99	17	58	0	8	2	0	33	0	12	0	61
13:00 - 14:00	140	18	115	0	8	1	0	11	0	5	0	61
14:00 - 15:00	161	30	128	0	4	3	0	12	0	5	0	44
15:00 - 16:00	136	29	95	0	3	1	0	11	0	5	0	35
16:00 - 17:00	164	21	106	0	4	4	0	8	0	10	0	40
17:00 - 18:00	187	21	131	0	9	2	0	19	0	4	0	38
18:00 - 19:00	188	21	123	0	5	4	0	8	0	3	0	31
19:00 - 20:00	150	23	161	0	4	1	0	4	0	3	0	23
20:00 - 21:00	106	20	121	0	2	0	0	8	0	3	0	14
21:00 - 22:00	72	16	77	0	3	2	0	6	0	8	0	18
16hr Total	**2086**	**367**	**1808**	**0**	**105**	**21**	**0**	**155**	**0**	**63**	**0**	**586**

Road	Sucat Interchange NB
Section	0
Direction	13
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	2	0	0	0	0	0	0	0	0	0	0	0
7:00 - 8:00	4	0	0	0	0	0	0	0	0	0	0	0
8:00 - 9:00	4	0	0	0	0	0	0	0	0	0	0	0
9:00 - 10:00	4	0	0	0	0	0	0	0	0	0	0	0
10:00 - 11:00	4	0	0	0	0	0	0	0	0	0	0	0
11:00 - 12:00	4	0	0	0	0	0	0	0	0	0	0	0
12:00 - 13:00	3	0	0	0	0	0	0	0	0	0	0	0
13:00 - 14:00	4	0	0	0	0	0	0	0	0	0	0	0
14:00 - 15:00	4	0	0	0	0	0	0	0	0	0	0	0
15:00 - 16:00	4	0	0	0	0	0	0	0	0	0	0	0
16:00 - 17:00	4	0	0	0	0	0	0	0	0	0	0	0
17:00 - 18:00	4	0	0	0	0	0	0	0	0	0	0	0
18:00 - 19:00	4	0	0	0	0	0	0	0	0	0	0	0
19:00 - 20:00	4	0	0	0	0	0	0	0	0	0	0	0
20:00 - 21:00	4	0	0	0	0	0	0	0	0	0	0	0
21:00 - 22:00	3	0	0	0	0	0	0	0	0	0	0	0
16hr Total	**60**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Road	Sucat Interchange NB
Section	0
Direction	14
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	7	0	0	0	0	0	0	1	0	0	0	0
7:00 - 8:00	11	0	0	0	0	0	0	1	0	0	0	0
8:00 - 9:00	12	0	0	0	0	0	0	0	0	0	0	0
9:00 - 10:00	11	0	0	0	0	0	0	1	0	0	0	0
10:00 - 11:00	10	0	0	0	0	0	0	5	0	0	0	2
11:00 - 12:00	8	0	0	0	0	0	0	7	0	0	0	1
12:00 - 13:00	7	0	0	0	0	0	0	6	0	0	0	1
13:00 - 14:00	8	0	0	0	0	0	0	3	0	0	0	2
14:00 - 15:00	10	0	0	0	0	0	0	7	0	0	0	1
15:00 - 16:00	11	0	0	0	0	0	0	6	0	0	0	1
16:00 - 17:00	11	0	0	0	0	0	0	5	0	0	0	1
17:00 - 18:00	12	0	0	0	0	0	0	5	0	0	0	3
18:00 - 19:00	14	0	0	0	0	0	0	6	0	0	0	1
19:00 - 20:00	14	0	0	0	0	0	0	5	0	0	0	0
20:00 - 21:00	9	0	0	0	0	0	0	4	0	0	0	3
21:00 - 22:00	7	0	0	0	0	0	0	5	0	0	0	0
16hr Total	**162**	**0**	**0**	**0**	**0**	**0**	**0**	**67**	**0**	**0**	**0**	**16**

Road	Sucat Interchange NB
Section	0
Direction	15
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	12	0	0	0	0	0	16	0	1	0	0	0
7:00 - 8:00	18	0	0	0	0	0	19	0	3	0	0	0
8:00 - 9:00	19	0	0	0	0	0	24	0	3	0	0	1
9:00 - 10:00	17	0	0	0	0	0	15	0	14	0	0	4
10:00 - 11:00	16	0	0	0	0	0	17	0	13	0	0	4
11:00 - 12:00	15	0	0	0	0	0	20	0	14	0	0	4
12:00 - 13:00	15	0	0	0	0	0	18	0	11	0	0	3
13:00 - 14:00	15	0	0	0	0	0	30	0	10	0	0	3
14:00 - 15:00	18	0	0	0	0	0	26	0	10	0	0	4
15:00 - 16:00	19	0	0	0	0	0	21	0	18	0	0	4
16:00 - 17:00	18	0	0	0	0	0	22	0	7	0	0	4
17:00 - 18:00	22	0	0	0	0	0	29	0	8	0	0	4
18:00 - 19:00	23	0	0	0	0	0	23	0	6	0	0	3
19:00 - 20:00	25	0	0	0	0	0	28	0	23	0	0	3
20:00 - 21:00	16	0	0	0	0	0	27	0	54	0	0	4
21:00 - 22:00	13	0	0	0	0	0	27	0	26	0	0	2
16hr Total	**281**	**0**	**0**	**0**	**0**	**0**	**362**	**0**	**221**	**0**	**0**	**47**

Road	Sucat Interchange NB
Section	0
Direction	16
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	187	0	0	0	0	0	8	3	0	1	0	8
7:00 - 8:00	266	0	1	0	8	0	9	3	0	1	0	24
8:00 - 9:00	287	0	0	0	9	0	12	2	0	0	0	24
9:00 - 10:00	265	0	1	0	6	0	7	3	0	3	0	44
10:00 - 11:00	242	0	3	0	4	0	9	13	0	4	0	56
11:00 - 12:00	217	0	0	0	4	0	8	18	0	9	0	50
12:00 - 13:00	216	0	0	0	4	0	10	13	0	10	0	50
13:00 - 14:00	219	0	2	0	1	0	16	9	0	6	0	56
14:00 - 15:00	271	0	1	0	4	0	14	18	0	3	0	52
15:00 - 16:00	280	0	1	0	3	0	10	11	0	4	0	54
16:00 - 17:00	291	0	0	0	3	0	10	13	0	0	0	56
17:00 - 18:00	333	0	0	0	4	0	14	15	0	5	0	69
18:00 - 19:00	345	0	1	0	4	0	10	18	0	0	0	44
19:00 - 20:00	368	0	2	0	2	0	14	14	0	1	0	36
20:00 - 21:00	239	0	0	0	4	0	13	7	0	19	0	66
21:00 - 22:00	188	0	4	0	4	0	14	15	0	2	0	41
16hr Total	**4214**	**0**	**16**	**0**	**64**	**0**	**178**	**175**	**0**	**68**	**0**	**730**

Road	Sucat Interchange NB
Section	0
Direction	17
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	88	9	131	9	0	22	0	4	1	0	0	4
7:00 - 8:00	98	19	321	13	2	42	0	8	1	0	4	9
8:00 - 9:00	98	14	360	8	1	35	0	8	1	0	2	17
9:00 - 10:00	102	14	280	16	0	26	0	12	2	0	18	23
10:00 - 11:00	99	18	341	22	2	25	0	12	5	0	36	31
11:00 - 12:00	88	16	245	17	4	25	0	8	5	0	41	34
12:00 - 13:00	85	13	212	6	2	18	0	12	5	0	29	24
13:00 - 14:00	85	13	220	11	1	28	0	8	4	0	36	25
14:00 - 15:00	84	14	251	9	1	25	0	7	5	0	52	34
15:00 - 16:00	75	10	205	6	0	18	0	8	4	0	21	17
16:00 - 17:00	103	18	293	11	0	38	0	9	5	0	13	28
17:00 - 18:00	116	20	324	2	1	19	0	11	1	0	10	27
18:00 - 19:00	110	24	320	8	1	31	0	6	3	0	11	35
19:00 - 20:00	97	25	313	2	0	34	0	3	4	0	8	31
20:00 - 21:00	73	17	208	8	1	23	0	4	4	0	26	16
21:00 - 22:00	77	16	217	3	0	13	0	4	3	0	39	19
16hr Total	**1478**	**260**	**4241**	**151**	**16**	**422**	**0**	**124**	**53**	**0**	**346**	**374**

Road	Sucat Interchange NB
Section	0
Direction	18
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	15	157	30	0	0	22	0	2	0	0	0	0
7:00 - 8:00	17	342	72	0	2	42	0	5	0	0	0	2
8:00 - 9:00	18	259	82	0	1	35	0	6	0	0	0	4
9:00 - 10:00	17	245	62	0	0	26	0	8	0	0	0	4
10:00 - 11:00	17	316	76	0	2	25	0	9	0	0	0	6
11:00 - 12:00	15	294	55	0	4	25	0	6	0	0	0	7
12:00 - 13:00	15	224	47	0	2	18	0	8	0	0	0	5
13:00 - 14:00	15	234	49	0	1	28	0	5	0	0	0	4
14:00 - 15:00	14	240	56	0	1	25	0	6	0	0	0	8
15:00 - 16:00	12	196	46	0	0	18	0	6	0	0	0	4
16:00 - 17:00	18	310	66	0	0	38	0	6	1	0	0	5
17:00 - 18:00	20	351	73	0	1	19	0	7	0	0	0	6
18:00 - 19:00	19	424	72	0	1	31	0	5	0	0	0	8
19:00 - 20:00	17	438	71	0	0	34	0	2	0	0	0	7
20:00 - 21:00	13	306	48	0	1	23	0	2	0	0	0	5
21:00 - 22:00	15	306	48	0	0	13	0	2	0	0	0	5
16hr Total	**257**	**4642**	**953**	**0**	**16**	**422**	**0**	**85**	**1**	**0**	**0**	**80**

Road	Sucat Interchange NB
Section	0
Direction	19
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	7	4	4	0	0	0	0	0	0	0	0	0
7:00 - 8:00	8	7	7	0	0	0	1	0	0	0	0	0
8:00 - 9:00	9	7	9	0	0	0	0	0	0	0	0	3
9:00 - 10:00	9	6	7	0	0	0	0	0	0	0	0	4
10:00 - 11:00	8	7	8	0	0	0	0	0	2	0	0	4
11:00 - 12:00	8	7	6	0	0	0	1	0	2	0	0	4
12:00 - 13:00	8	5	6	0	0	0	0	0	3	0	0	4
13:00 - 14:00	8	5	5	0	0	0	1	0	2	0	0	4
14:00 - 15:00	8	5	6	0	0	0	0	0	2	0	0	4
15:00 - 16:00	8	5	4	0	0	0	0	0	1	0	0	3
16:00 - 17:00	9	7	7	0	0	0	0	0	2	0	0	4
17:00 - 18:00	10	7	8	0	0	0	0	0	0	0	0	4
18:00 - 19:00	9	10	7	0	0	0	1	0	1	0	0	4
19:00 - 20:00	8	9	8	0	0	0	0	0	1	0	0	4
20:00 - 21:00	6	6	6	0	0	0	0	0	0	0	0	2
21:00 - 22:00	7	7	6	0	0	0	0	0	0	0	0	2
16hr Total	**130**	**104**	**104**	**0**	**0**	**0**	**4**	**0**	**16**	**0**	**0**	**50**

Road	Sucat Interchange NB
Section	0
Direction	20
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	193	0	0	0	0	0	0	6	0	4	0	4
7:00 - 8:00	215	0	0	0	4	0	0	13	0	8	0	10
8:00 - 9:00	215	0	0	0	3	0	0	16	0	6	0	20
9:00 - 10:00	225	0	0	0	3	0	0	21	0	17	0	28
10:00 - 11:00	218	0	0	0	6	0	0	21	0	12	0	38
11:00 - 12:00	192	0	0	0	6	0	0	16	0	14	0	41
12:00 - 13:00	187	0	0	0	4	0	0	20	0	15	0	30
13:00 - 14:00	188	0	0	0	6	0	0	14	0	26	0	31
14:00 - 15:00	184	0	0	0	3	0	0	15	0	20	0	40
15:00 - 16:00	167	0	0	0	2	0	0	15	0	12	0	21
16:00 - 17:00	227	0	0	0	4	0	0	16	0	16	0	33
17:00 - 18:00	255	0	0	0	3	0	0	17	0	20	0	34
18:00 - 19:00	240	0	0	0	1	0	0	13	0	10	0	44
19:00 - 20:00	213	0	0	0	2	0	0	6	0	7	0	38
20:00 - 21:00	162	0	0	0	2	0	0	6	0	15	0	21
21:00 - 22:00	174	0	0	0	2	0	0	6	0	9	0	24
16hr Total	**3255**	**0**	**0**	**0**	**51**	**0**	**0**	**221**	**0**	**211**	**0**	**457**

Stn._02_Sucat_Interchange_Southbound

Road	Sucat Interchange SB
Section	
Direction	1
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	11	0	20	0	3	0	0	0	3	3	0	5
7:00 - 8:00	24	2	39	0	4	0	0	2	5	3	0	8
8:00 - 9:00	35	2	38	0	10	0	0	3	4	1	0	8
9:00 - 10:00	33	3	29	0	8	0	0	6	1	2	0	15
10:00 - 11:00	29	4	39	0	3	0	0	5	2	1	0	17
11:00 - 12:00	29	1	38	0	7	0	0	4	3	3	0	12
12:00 - 13:00	38	3	28	0	8	0	0	8	4	4	0	8
13:00 - 14:00	35	2	39	0	8	0	0	4	1	11	0	9
14:00 - 15:00	33	3	41	0	4	0	0	5	3	8	0	9
15:00 - 16:00	39	5	41	0	7	0	0	5	3	3	0	8
16:00 - 17:00	57	4	57	0	18	0	0	5	7	7	0	15
17:00 - 18:00	74	4	53	0	23	0	0	7	17	12	0	21
18:00 - 19:00	64	4	53	0	12	0	0	5	12	5	0	12
19:00 - 20:00	40	2	37	0	5	0	0	0	3	2	0	5
20:00 - 21:00	32	2	29	0	4	0	0	1	3	4	0	5
21:00 - 22:00	30	2	24	0	6	0	0	1	5	1	0	5
16hr Total	**603**	**43**	**605**	**0**	**130**	**0**	**0**	**61**	**76**	**70**	**0**	**162**

Road	Sucat Interchange SB
Section	0
Direction	2
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	8	9	80	0	0	0	0	0	3	0	0	6
7:00 - 8:00	18	19	160	1	0	0	2	2	5	0	0	10
8:00 - 9:00	25	28	159	1	0	0	1	3	4	0	0	12
9:00 - 10:00	26	31	123	0	0	0	0	6	1	0	0	24
10:00 - 11:00	22	26	161	0	0	0	1	5	2	0	0	27
11:00 - 12:00	22	16	160	2	0	0	0	4	3	0	0	19
12:00 - 13:00	29	23	119	0	0	0	4	8	4	0	0	12
13:00 - 14:00	26	19	161	1	0	0	0	4	1	0	0	13
14:00 - 15:00	24	26	173	4	0	0	3	5	3	0	0	14
15:00 - 16:00	31	45	170	1	0	0	2	5	3	0	0	11
16:00 - 17:00	43	44	238	14	0	0	2	5	7	0	0	23
17:00 - 18:00	56	39	221	16	0	0	1	7	17	0	0	32
18:00 - 19:00	48	40	221	9	0	0	1	5	12	0	0	17
19:00 - 20:00	30	16	153	3	0	0	1	0	3	0	0	8
20:00 - 21:00	25	18	120	2	0	0	0	1	3	0	0	7
21:00 - 22:00	23	20	99	1	0	0	0	1	5	0	0	8
16hr Total	**456**	**419**	**2518**	**55**	**0**	**0**	**18**	**61**	**76**	**0**	**0**	**243**

Road	Sucat Interchange SB
Section	0
Direction	3
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	17	0	0	0	0	0	0	0	0	0	0	5
7:00 - 8:00	35	2	0	0	0	0	2	0	0	0	6	9
8:00 - 9:00	50	5	0	0	0	0	1	0	0	0	16	10
9:00 - 10:00	48	5	0	0	0	0	0	0	0	0	10	21
10:00 - 11:00	42	4	0	0	0	0	1	0	0	0	7	23
11:00 - 12:00	42	3	0	0	0	0	0	0	0	0	11	16
12:00 - 13:00	54	4	0	0	0	0	4	0	0	0	11	9
13:00 - 14:00	50	3	0	0	0	0	0	0	0	0	3	11
14:00 - 15:00	48	4	0	0	0	0	3	0	0	0	13	12
15:00 - 16:00	58	6	0	0	0	0	2	0	0	0	9	9
16:00 - 17:00	83	7	0	0	0	0	2	0	0	0	22	19
17:00 - 18:00	108	6	0	0	0	0	1	0	0	0	21	27
18:00 - 19:00	93	6	0	0	0	0	1	0	0	0	12	14
19:00 - 20:00	58	2	0	0	0	0	1	0	0	0	5	7
20:00 - 21:00	48	3	0	0	0	0	0	0	0	0	6	6
21:00 - 22:00	43	4	0	0	0	0	0	0	0	0	4	6
16hr Total	**877**	**64**	**0**	**0**	**0**	**0**	**18**	**0**	**0**	**0**	**156**	**204**

Road	Sucat Interchange SB
Section	0
Direction	4
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	22	0	29	0	0	0	0	3	0	4	0	4
7:00 - 8:00	47	2	57	0	0	0	0	6	0	6	0	6
8:00 - 9:00	67	2	56	0	0	0	0	9	0	4	0	7
9:00 - 10:00	64	3	44	0	0	0	0	20	0	5	0	12
10:00 - 11:00	58	4	57	0	0	0	0	20	0	4	0	13
11:00 - 12:00	58	1	56	0	0	0	0	13	0	4	0	10
12:00 - 13:00	73	3	42	0	0	0	0	26	0	6	0	6
13:00 - 14:00	68	2	57	0	0	0	0	14	0	12	0	6
14:00 - 15:00	64	3	61	0	0	0	0	13	0	8	0	8
15:00 - 16:00	77	5	61	0	0	0	0	18	0	5	0	5
16:00 - 17:00	112	4	84	0	0	0	0	20	0	9	0	11
17:00 - 18:00	145	4	79	0	0	0	0	24	0	16	0	16
18:00 - 19:00	126	4	78	0	0	0	0	15	0	7	0	9
19:00 - 20:00	79	2	55	0	0	0	0	3	0	4	0	4
20:00 - 21:00	64	2	43	0	0	0	0	5	0	6	0	4
21:00 - 22:00	58	2	34	0	0	0	0	5	0	2	0	4
16hr Total	**1182**	**43**	**893**	**0**	**0**	**0**	**0**	**214**	**0**	**102**	**0**	**125**

Road	Sucat Interchange SB
Section	0
Direction	5
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:00 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0
8:00 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0
9:00 - 10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:00 - 11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:00 - 12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:00 - 13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:00 - 14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:00 - 15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:00 - 16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:00 - 17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:00 - 18:00	0	0	0	0	0	0	0	0	0	0	0	0
18:00 - 19:00	0	0	0	0	0	0	0	0	0	0	0	0
19:00 - 20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:00 - 21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:00 - 22:00	0	0	0	0	0	0	0	0	0	0	0	0
16hr Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Road	Sucat Interchange SB
Section	0
Direction	6
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	64	0	0	0	1	0	17	5	2	0	0	4
7:00 - 8:00	118	0	0	0	2	0	24	10	3	0	0	13
8:00 - 9:00	170	0	0	0	6	0	34	16	0	0	0	24
9:00 - 10:00	191	0	0	0	3	0	36	16	3	0	0	41
10:00 - 11:00	156	0	0	0	6	0	20	8	9	0	0	38
11:00 - 12:00	125	0	0	0	4	0	38	22	6	0	0	41
12:00 - 13:00	113	0	0	0	8	0	43	26	0	0	0	29
13:00 - 14:00	142	0	0	0	7	0	33	32	0	0	0	29
14:00 - 15:00	142	0	0	0	6	0	26	10	1	0	0	32
15:00 - 16:00	139	2	0	0	2	0	32	16	0	0	0	23
16:00 - 17:00	149	0	0	0	2	0	30	17	0	0	0	45
17:00 - 18:00	172	0	0	0	1	0	23	11	0	0	0	23
18:00 - 19:00	166	0	0	0	3	0	29	12	0	0	0	34
19:00 - 20:00	96	0	0	0	1	0	37	17	0	0	0	39
20:00 - 21:00	70	0	0	0	3	0	17	6	0	0	0	20
21:00 - 22:00	72	0	0	0	0	0	31	8	2	0	0	11
16hr Total	**2085**	**2**	**0**	**0**	**55**	**0**	**470**	**232**	**26**	**0**	**0**	**446**

Road	Sucat Interchange SB
Section	0
Direction	7
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	19	1	0	0	0	0	0	0	0	0	0	4
7:00 - 8:00	34	4	0	0	0	0	0	0	0	0	0	12
8:00 - 9:00	51	5	1	0	0	0	0	0	0	0	0	22
9:00 - 10:00	56	6	0	0	0	0	0	0	0	0	0	36
10:00 - 11:00	46	4	0	0	0	0	0	0	0	0	0	34
11:00 - 12:00	37	3	0	0	0	0	0	0	0	0	0	36
12:00 - 13:00	34	2	4	0	0	0	0	0	0	0	0	24
13:00 - 14:00	41	2	1	0	0	0	0	0	0	0	0	25
14:00 - 15:00	41	3	3	0	0	0	0	0	0	0	0	28
15:00 - 16:00	41	8	0	0	0	0	0	0	0	0	0	21
16:00 - 17:00	44	3	1	0	0	0	0	0	0	0	0	40
17:00 - 18:00	50	1	0	0	0	0	0	0	0	0	0	19
18:00 - 19:00	48	0	0	0	0	0	0	0	0	0	0	29
19:00 - 20:00	28	0	0	0	0	0	0	0	0	0	0	34
20:00 - 21:00	22	1	0	0	0	0	0	0	0	0	0	17
21:00 - 22:00	21	0	0	0	0	0	0	0	0	0	0	9
16hr Total	**613**	**43**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**390**

Road	Sucat Interchange SB
Section	0
Direction	8
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	19	0	0	0	0	0	0	0	0	0	0	4
7:00 - 8:00	34	2	0	0	0	0	0	1	0	1	0	8
8:00 - 9:00	48	2	0	0	4	0	0	3	0	0	0	17
9:00 - 10:00	54	3	0	0	1	0	0	1	0	4	0	28
10:00 - 11:00	45	2	0	0	1	0	0	0	0	0	0	27
11:00 - 12:00	35	1	0	0	2	0	0	4	0	0	0	28
12:00 - 13:00	33	2	0	0	3	0	0	4	0	0	0	19
13:00 - 14:00	41	0	0	0	2	0	0	4	0	2	0	20
14:00 - 15:00	41	2	1	0	3	0	0	1	0	0	0	21
15:00 - 16:00	39	5	0	0	1	0	0	2	0	3	0	16
16:00 - 17:00	42	1	0	0	2	0	0	3	0	4	0	32
17:00 - 18:00	49	0	0	0	0	0	0	1	0	2	0	16
18:00 - 19:00	47	0	0	0	1	0	0	1	0	1	0	22
19:00 - 20:00	27	0	0	0	1	0	0	2	0	1	0	27
20:00 - 21:00	19	0	0	0	1	0	0	0	0	4	0	14
21:00 - 22:00	21	0	0	0	0	0	0	0	0	5	0	8
16hr Total	**594**	**20**	**1**	**0**	**22**	**0**	**0**	**27**	**0**	**27**	**0**	**307**

Road	Sucat Interchange SB
Section	0
Direction	9
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	19	0	0	0	0	0	0	0	0	0	0	4
7:00 - 8:00	34	2	0	0	0	0	0	1	0	1	0	8
8:00 - 9:00	48	2	0	0	4	0	0	3	0	0	0	17
9:00 - 10:00	54	3	0	0	1	0	0	1	0	4	0	28
10:00 - 11:00	45	2	0	0	1	0	0	0	0	0	0	27
11:00 - 12:00	35	1	0	0	2	0	0	4	0	0	0	28
12:00 - 13:00	33	2	0	0	3	0	0	4	0	0	0	19
13:00 - 14:00	41	0	0	0	2	0	0	4	0	2	0	20
14:00 - 15:00	41	2	1	0	3	0	0	1	0	0	0	21
15:00 - 16:00	39	5	0	0	1	0	0	2	0	3	0	16
16:00 - 17:00	42	1	0	0	2	0	0	3	0	4	0	32
17:00 - 18:00	49	0	0	0	0	0	0	1	0	2	0	16
18:00 - 19:00	47	0	0	0	1	0	0	1	0	1	0	22
19:00 - 20:00	27	0	0	0	1	0	0	2	0	1	0	27
20:00 - 21:00	19	0	0	0	1	0	0	0	0	4	0	14
21:00 - 22:00	21	0	0	0	0	0	0	0	0	5	0	8
16hr Total	**1025**	**61**	**0**	**0**	**210**	**0**	**0**	**98**	**48**	**0**	**17**	**140**

Road	Sucat Interchange SB
Section	0
Direction	10
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	146	4	68	0	0	0	8	6	0	0	0	8
7:00 - 8:00	209	7	100	0	0	0	10	8	0	1	1	15
8:00 - 9:00	278	9	131	0	0	0	13	17	0	0	0	18
9:00 - 10:00	250	7	106	0	0	0	8	17	4	2	0	20
10:00 - 11:00	228	7	85	0	0	0	9	23	4	3	4	25
11:00 - 12:00	214	7	70	0	0	0	8	33	6	5	1	25
12:00 - 13:00	180	4	60	0	0	0	10	40	6	7	2	25
13:00 - 14:00	224	4	85	0	0	0	19	23	7	3	0	30
14:00 - 15:00	252	6	87	0	0	0	14	29	4	3	1	24
15:00 - 16:00	239	7	76	0	0	0	10	23	5	3	2	23
16:00 - 17:00	250	6	78	0	0	0	11	21	2	3	1	24
17:00 - 18:00	296	8	133	0	0	0	14	26	2	3	1	25
18:00 - 19:00	278	5	143	0	0	0	11	22	1	1	0	18
19:00 - 20:00	268	6	160	0	0	0	15	14	3	1	0	14
20:00 - 21:00	191	9	102	0	0	0	15	16	3	6	1	19
21:00 - 22:00	154	7	81	0	0	0	14	16	1	4	3	15
16hr Total	**3657**	**103**	**1565**	**0**	**0**	**0**	**189**	**334**	**48**	**45**	**17**	**328**

Road	Sucat Interchange SB
Section	0
Direction	11
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	44	37	144	0	0	0	0	0	0	0	0	16
7:00 - 8:00	63	52	211	0	0	0	0	0	0	0	0	33
8:00 - 9:00	83	70	276	0	0	2	0	0	0	0	0	38
9:00 - 10:00	74	57	224	0	0	2	0	0	0	0	0	42
10:00 - 11:00	69	62	179	0	0	1	0	0	0	0	0	52
11:00 - 12:00	65	53	146	0	0	3	0	0	0	0	0	57
12:00 - 13:00	55	41	125	0	0	2	0	0	0	0	0	54
13:00 - 14:00	67	41	176	0	0	3	0	0	0	0	0	64
14:00 - 15:00	76	50	182	0	0	4	0	0	0	0	0	51
15:00 - 16:00	72	55	163	0	0	1	0	0	0	0	0	47
16:00 - 17:00	74	49	166	0	0	4	0	0	0	0	0	51
17:00 - 18:00	88	58	280	0	0	4	0	0	0	0	0	53
18:00 - 19:00	84	47	304	0	0	4	0	0	0	0	0	37
19:00 - 20:00	80	53	337	0	0	1	0	0	0	0	0	29
20:00 - 21:00	58	68	216	0	0	0	0	0	0	0	0	40
21:00 - 22:00	46	60	171	0	0	2	0	0	0	0	0	32
16hr Total	**1098**	**853**	**3300**	**0**	**0**	**33**	**0**	**0**	**0**	**0**	**0**	**696**

Road	Sucat Interchange SB
Section	0
Direction	12
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	111	0	51	0	0	0	0	4	0	1	0	9
7:00 - 8:00	158	0	75	0	0	0	0	4	0	2	0	18
8:00 - 9:00	211	0	98	0	0	0	0	7	0	0	0	21
9:00 - 10:00	189	0	78	0	0	0	0	8	0	6	0	23
10:00 - 11:00	172	0	63	0	0	0	0	10	0	7	0	28
11:00 - 12:00	163	0	51	0	0	0	0	15	0	13	0	29
12:00 - 13:00	138	0	44	0	0	0	0	17	0	21	0	28
13:00 - 14:00	169	0	62	0	0	0	0	11	0	11	0	35
14:00 - 15:00	191	0	64	0	0	0	0	13	0	9	0	27
15:00 - 16:00	182	0	58	0	0	0	0	11	0	7	0	26
16:00 - 17:00	189	0	59	0	0	0	0	10	0	8	0	27
17:00 - 18:00	225	0	98	0	0	0	0	11	0	7	0	29
18:00 - 19:00	212	0	107	0	0	0	0	10	0	4	0	21
19:00 - 20:00	203	0	118	0	0	0	0	6	0	5	0	15
20:00 - 21:00	144	0	76	0	0	0	0	7	0	18	0	23
21:00 - 22:00	117	0	60	0	0	0	0	8	0	12	0	17
16hr Total	**2774**	**0**	**1162**	**0**	**0**	**0**	**0**	**152**	**0**	**131**	**0**	**376**

Road	Sucat Interchange SB
Section	0
Direction	13
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	7	1	0	0	0	0	0	0	1	0	0	0
7:00 - 8:00	15	1	0	0	3	0	0	0	0	0	0	2
8:00 - 9:00	16	4	0	0	6	0	0	0	0	0	0	4
9:00 - 10:00	15	2	0	0	5	0	0	0	0	0	1	6
10:00 - 11:00	11	3	0	0	6	0	0	0	0	0	3	8
11:00 - 12:00	14	3	0	0	5	0	0	0	0	0	4	9
12:00 - 13:00	10	3	0	0	3	0	0	0	2	0	2	6
13:00 - 14:00	12	3	0	0	5	0	0	0	0	0	3	6
14:00 - 15:00	13	3	0	0	5	0	0	0	2	0	2	10
15:00 - 16:00	11	2	0	0	1	0	0	0	2	0	2	6
16:00 - 17:00	12	2	0	0	1	0	0	0	0	0	1	6
17:00 - 18:00	11	0	0	0	2	0	0	0	0	0	2	4
18:00 - 19:00	8	3	0	0	2	0	0	0	2	0	1	6
19:00 - 20:00	12	0	0	0	0	0	0	0	2	0	0	4
20:00 - 21:00	9	2	0	0	3	0	0	0	1	0	3	4
21:00 - 22:00	8	0	0	0	4	0	0	0	2	0	6	4
16hr Total	**184**	**32**	**0**	**0**	**51**	**0**	**0**	**0**	**14**	**0**	**30**	**85**

Road	Sucat Interchange SB
Section	0
Direction	14
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	44	3	33	1	0	0	0	3	1	0	0	2
7:00 - 8:00	85	5	93	5	0	0	1	1	0	0	0	9
8:00 - 9:00	92	9	136	6	0	0	0	0	0	0	0	15
9:00 - 10:00	88	5	75	11	0	0	0	0	0	1	1	17
10:00 - 11:00	64	6	81	8	0	0	0	0	0	0	8	26
11:00 - 12:00	85	6	80	8	0	0	1	0	0	0	7	30
12:00 - 13:00	65	8	58	4	0	0	0	0	2	0	5	21
13:00 - 14:00	70	6	65	0	0	0	1	0	0	0	9	20
14:00 - 15:00	74	6	81	6	0	0	0	3	2	0	7	32
15:00 - 16:00	65	6	92	3	0	0	0	1	2	0	5	19
16:00 - 17:00	68	6	76	3	0	0	0	0	0	0	4	19
17:00 - 18:00	63	4	99	0	0	0	0	0	0	0	4	11
18:00 - 19:00	51	4	83	5	0	0	1	0	2	0	1	19
19:00 - 20:00	66	4	69	0	0	0	0	0	2	0	0	12
20:00 - 21:00	48	5	34	5	0	0	0	0	1	0	4	12
21:00 - 22:00	53	4	30	3	0	0	0	0	2	0	9	12
16hr Total	**1081**	**87**	**1185**	**68**	**0**	**0**	**4**	**8**	**14**	**1**	**64**	**276**

Road	Sucat Interchange SB
Section	0
Direction	15
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	16	34	41	0	0	0	0	0	1	0	0	4
7:00 - 8:00	33	44	115	0	0	0	0	0	0	0	0	17
8:00 - 9:00	36	74	167	0	0	1	0	0	0	0	0	27
9:00 - 10:00	34	50	95	0	0	1	0	0	0	0	0	34
10:00 - 11:00	24	59	100	0	0	1	0	0	0	0	0	47
11:00 - 12:00	32	55	97	0	0	2	0	0	0	0	0	57
12:00 - 13:00	24	63	72	0	0	3	0	0	2	0	0	39
13:00 - 14:00	26	56	80	0	0	5	0	0	0	0	0	38
14:00 - 15:00	29	59	101	0	0	3	0	0	2	0	0	60
15:00 - 16:00	25	51	113	0	0	2	0	0	2	0	0	37
16:00 - 17:00	26	46	94	0	0	0	0	0	0	0	0	35
17:00 - 18:00	25	32	122	0	0	1	0	0	0	0	0	20
18:00 - 19:00	20	48	102	0	0	1	0	0	2	0	0	35
19:00 - 20:00	26	36	85	0	0	0	0	0	2	0	0	25
20:00 - 21:00	19	43	43	0	0	0	0	0	1	0	0	21
21:00 - 22:00	20	33	37	0	0	0	0	0	2	0	0	25
16hr Total	**415**	**783**	**1464**	**0**	**0**	**20**	**0**	**0**	**14**	**0**	**0**	**521**

Road	Sucat Interchange SB
Section	0
Direction	16
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	79	0	29	0	0	0	0	1	0	0	0	3
7:00 - 8:00	155	0	82	0	1	0	0	0	0	1	0	10
8:00 - 9:00	168	0	120	0	2	0	0	0	0	0	0	15
9:00 - 10:00	162	0	67	0	1	0	0	0	0	2	0	21
10:00 - 11:00	117	0	72	0	3	0	0	0	0	0	0	27
11:00 - 12:00	152	0	70	0	1	0	0	0	0	0	0	32
12:00 - 13:00	118	0	51	0	0	0	0	0	0	0	0	22
13:00 - 14:00	128	0	57	0	3	0	0	0	0	0	0	21
14:00 - 15:00	134	0	71	0	1	0	0	2	0	1	0	34
15:00 - 16:00	118	0	81	0	1	0	0	1	0	0	0	21
16:00 - 17:00	124	0	66	0	0	0	0	0	0	0	0	21
17:00 - 18:00	114	0	87	0	1	0	0	0	0	0	0	12
18:00 - 19:00	94	0	74	0	1	0	0	0	0	1	0	20
19:00 - 20:00	120	0	61	0	0	0	0	0	0	0	0	14
20:00 - 21:00	87	0	31	0	1	0	0	0	0	0	0	13
21:00 - 22:00	97	0	28	0	3	0	0	0	0	0	0	13
16hr Total	**1967**	**0**	**1047**	**0**	**19**	**0**	**0**	**4**	**0**	**5**	**0**	**299**

Road	Sucat Interchange SB
Section	0
Direction	17
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	100	0	20	0	0	0	0	5	0	0	0	0
7:00 - 8:00	79	0	50	0	6	0	0	17	3	0	0	0
8:00 - 9:00	61	0	50	0	0	0	0	18	3	0	0	1
9:00 - 10:00	66	0	46	0	2	0	0	18	4	0	0	0
10:00 - 11:00	80	0	56	0	9	0	0	19	13	0	0	6
11:00 - 12:00	58	0	32	0	8	0	0	12	15	0	0	6
12:00 - 13:00	56	0	32	0	3	0	0	9	12	0	0	6
13:00 - 14:00	54	0	30	0	6	0	0	9	11	0	0	7
14:00 - 15:00	51	0	33	0	1	0	0	10	10	0	0	9
15:00 - 16:00	37	0	19	0	1	0	0	6	6	0	0	1
16:00 - 17:00	62	0	40	0	2	0	0	7	16	0	0	3
17:00 - 18:00	66	0	45	0	4	0	0	9	3	0	0	11
18:00 - 19:00	70	0	47	0	1	0	0	8	4	0	0	17
19:00 - 20:00	75	0	52	0	1	0	0	6	5	0	0	14
20:00 - 21:00	56	0	35	0	2	0	0	6	5	0	0	5
21:00 - 22:00	64	0	41	0	2	0	0	7	3	0	0	10
16hr Total	**1035**	**0**	**628**	**0**	**48**	**0**	**0**	**166**	**113**	**0**	**0**	**96**

Road	Sucat Interchange SB
Section	0
Direction	18
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	226	0	0	0	0	21	0	37	0	0	0	1
7:00 - 8:00	178	5	0	0	8	41	5	152	5	0	0	0
8:00 - 9:00	136	2	0	0	1	34	3	157	5	0	0	2
9:00 - 10:00	151	3	0	0	3	24	4	164	8	0	0	1
10:00 - 11:00	180	4	0	0	13	23	6	162	26	0	0	11
11:00 - 12:00	130	3	0	0	10	25	5	106	29	0	0	13
12:00 - 13:00	127	2	0	0	4	16	4	79	21	0	0	11
13:00 - 14:00	122	3	0	0	9	27	5	84	22	0	0	14
14:00 - 15:00	115	3	0	0	4	23	2	88	20	0	0	18
15:00 - 16:00	83	1	0	0	2	18	0	50	14	0	0	4
16:00 - 17:00	139	3	0	0	3	37	2	63	30	0	0	6
17:00 - 18:00	148	4	0	0	5	17	1	87	6	0	0	20
18:00 - 19:00	159	4	0	0	3	30	2	74	8	0	0	30
19:00 - 20:00	168	4	0	0	3	33	1	49	12	0	0	26
20:00 - 21:00	127	3	0	0	3	21	4	53	12	0	0	10
21:00 - 22:00	145	3	0	0	3	10	4	65	7	0	0	18
16hr Total	**2334**	**47**	**0**	**0**	**74**	**400**	**48**	**1470**	**225**	**0**	**0**	**185**

Road	Sucat Interchange SB
Section	0
Direction	19
Date	10-Apr-19

Hourly Summaries

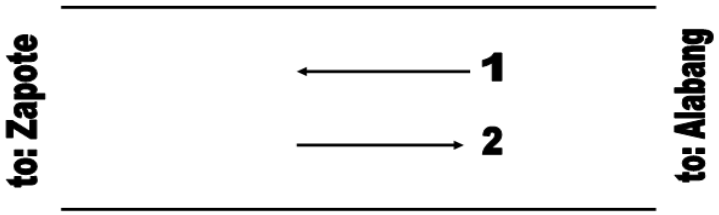
Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	218	167	101	8	0	42	0	5	0	0	0	1
7:00 - 8:00	173	360	252	8	6	82	0	17	1	1	4	0
8:00 - 9:00	132	267	258	2	0	66	0	18	1	2	2	3
9:00 - 10:00	147	253	231	5	2	49	0	18	2	7	17	1
10:00 - 11:00	176	329	288	14	9	47	0	19	7	8	28	14
11:00 - 12:00	125	308	169	9	8	50	0	12	7	10	34	18
12:00 - 13:00	123	229	165	2	3	32	0	9	6	9	24	16
13:00 - 14:00	118	243	153	11	6	54	0	9	6	12	27	18
14:00 - 15:00	112	248	171	3	1	48	0	10	5	12	45	24
15:00 - 16:00	81	195	104	3	1	33	0	6	3	4	16	5
16:00 - 17:00	135	324	206	8	2	73	0	7	8	3	9	8
17:00 - 18:00	143	371	227	2	4	36	0	9	1	2	6	28
18:00 - 19:00	154	450	238	3	1	59	0	8	2	2	10	42
19:00 - 20:00	164	467	267	2	1	66	0	6	3	2	8	37
20:00 - 21:00	124	322	184	3	2	43	0	6	3	5	22	14
21:00 - 22:00	140	323	207	0	2	23	0	7	1	2	30	25
16hr Total	**2265**	**4856**	**3221**	**83**	**48**	**803**	**0**	**166**	**56**	**81**	**282**	**254**

Road	Sucat Interchange SB
Section	0
Direction	20
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	117	4	67	0	0	0	0	8	0	0	0	0
7:00 - 8:00	92	7	167	0	17	0	0	33	0	5	0	0
8:00 - 9:00	70	5	170	0	3	0	0	34	0	3	0	2
9:00 - 10:00	77	5	152	0	6	0	0	37	0	21	0	0
10:00 - 11:00	94	7	190	0	26	0	0	35	0	20	0	8
11:00 - 12:00	67	6	112	0	22	0	0	23	0	28	0	11
12:00 - 13:00	67	5	108	0	8	0	0	17	0	22	0	10
13:00 - 14:00	63	4	102	0	17	0	0	20	0	28	0	10
14:00 - 15:00	61	5	113	0	6	0	0	19	0	26	0	14
15:00 - 16:00	43	5	69	0	5	0	0	11	0	11	0	2
16:00 - 17:00	72	7	135	0	5	0	0	14	0	7	0	5
17:00 - 18:00	77	7	149	0	10	0	0	20	0	5	0	16
18:00 - 19:00	82	9	158	0	6	0	0	17	0	6	0	25
19:00 - 20:00	89	9	176	0	5	0	0	11	0	3	0	23
20:00 - 21:00	66	6	122	0	7	0	0	12	0	10	0	9
21:00 - 22:00	75	7	137	0	6	0	0	14	0	3	0	16
16hr Total	**1212**	**98**	**2127**	**0**	**149**	**0**	**0**	**325**	**0**	**198**	**0**	**151**

Station 3 (SM Southmall)



Road	Zapote-Alabang Road
Section	SM Southmall
Direction	1
Date	10-Apr-19

Hourly Summaries

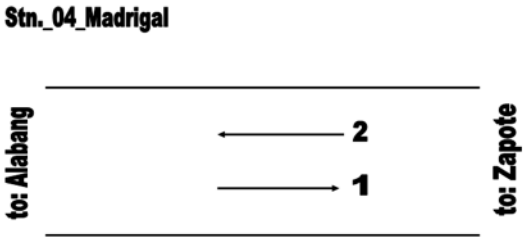
Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	326	258	588	0	24	12	33	43	20	0	0	10
7:00 - 8:00	276	284	585	2	9	4	34	42	3	0	0	2
8:00 - 9:00	204	195	469	3	7	9	34	15	1	0	1	4
9:00 - 10:00	433	413	648	0	18	9	58	22	1	1	0	2
10:00 - 11:00	356	385	475	5	6	0	25	30	5	0	0	5
11:00 - 12:00	312	322	324	2	4	2	25	25	3	1	0	3
12:00 - 13:00	360	301	391	6	5	5	21	11	5	0	0	6
13:00 - 14:00	419	316	440	1	7	4	10	5	0	0	0	6
14:00 - 15:00	394	380	475	0	8	2	15	16	2	2	0	0
15:00 - 16:00	323	187	347	6	16	2	38	45	6	1	0	7
16:00 - 17:00	299	176	428	3	9	7	31	29	1	0	0	5
17:00 - 18:00	324	266	543	2	7	1	27	14	3	0	1	4
18:00 - 19:00	228	207	435	2	10	9	37	12	0	0	1	3
19:00 - 20:00	259	263	407	2	7	2	36	18	0	0	0	2
20:00 - 21:00	275	229	304	0	4	16	29	11	0	0	0	4
21:00 - 22:00	305	264	316	1	5	7	19	11	3	0	0	1
16hr Total	**5093**	**4446**	**7175**	**35**	**146**	**91**	**472**	**349**	**53**	**5**	**3**	**64**

Road	Zapote-Alabang Road
Section	SM Southmall
Direction	2
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	175	285	340	1	12	38	57	0	0	0	0	8
7:00 - 8:00	150	235	365	2	17	35	37	0	0	0	0	7
8:00 - 9:00	145	288	330	4	18	52	64	11	0	0	0	11
9:00 - 10:00	165	253	305	3	16	36	34	2	0	0	0	8
10:00 - 11:00	160	165	170	0	6	17	31	0	0	0	0	7
11:00 - 12:00	160	180	140	0	10	21	1	0	0	0	0	8
12:00 - 13:00	130	120	135	0	11	40	45	0	0	0	0	4
13:00 - 14:00	115	130	125	0	14	20	40	0	0	0	0	7
14:00 - 15:00	135	122	135	0	8	19	30	0	0	0	0	6
15:00 - 16:00	125	140	115	1	6	22	14	0	0	0	0	6
16:00 - 17:00	160	180	185	0	4	13	5	10	0	0	0	17
17:00 - 18:00	177	185	207	1	19	33	17	29	4	0	0	28
18:00 - 19:00	243	95	172	21	25	28	10	21	0	15	0	50
19:00 - 20:00	207	79	114	22	14	45	6	29	0	12	0	35
20:00 - 21:00	248	155	233	0	23	25	13	7	0	0	0	12
21:00 - 22:00	384	278	337	0	36	35	21	17	0	12	0	23
16hr Total	**2879**	**2890**	**3408**	**55**	**239**	**479**	**425**	**126**	**4**	**39**	**0**	**237**

Station 4 (Madrigal Business Park)



Road	Zapote-Alabang Road
Section	Madrigal Business Park
Direction	1
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	362	316	525	6	22	20	14	24	6	0	0	13
7:00 - 8:00	442	268	548	15	13	11	23	26	10	0	0	9
8:00 - 9:00	472	285	491	5	11	19	27	31	33	1	0	15
9:00 - 10:00	530	222	424	6	10	25	24	29	26	2	0	9
10:00 - 11:00	415	220	466	4	8	6	9	23	10	1	0	5
11:00 - 12:00	454	207	321	0	9	12	11	20	24	3	0	1
12:00 - 13:00	514	221	356	0	12	1	14	31	10	5	0	2
13:00 - 14:00	455	206	375	0	3	0	11	17	4	0	0	3
14:00 - 15:00	500	293	392	0	5	6	11	5	0	0	0	4
15:00 - 16:00	472	275	492	1	7	5	10	6	1	0	0	4
16:00 - 17:00	417	266	311	0	7	2	12	5	2	0	0	3
17:00 - 18:00	414	220	416	0	3	5	15	10	0	0	0	4
18:00 - 19:00	403	253	330	0	3	2	17	8	4	0	0	2
19:00 - 20:00	299	202	311	0	3	7	8	8	0	0	0	0
20:00 - 21:00	355	191	373	0	2	7	5	6	0	2	0	6
21:00 - 22:00	365	278	320	0	4	9	15	7	0	3	0	1
16hr Total	**6869**	**3923**	**6451**	**37**	**122**	**137**	**226**	**256**	**130**	**17**	**0**	**81**

Road	Zapote-Alabang Road
Section	Madrigal Business Park
Direction	2
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	327	248	316	3	27	44	27	15	0	0	0	8
7:00 - 8:00	478	390	413	0	10	25	14	10	0	1	0	12
8:00 - 9:00	445	303	303	4	7	26	29	18	0	0	0	5
9:00 - 10:00	480	393	322	2	9	15	23	8	0	3	0	8
10:00 - 11:00	532	370	447	2	7	14	12	9	1	0	0	9
11:00 - 12:00	427	401	491	2	6	12	16	10	0	0	0	11
12:00 - 13:00	421	388	404	2	8	13	26	14	0	0	0	7
13:00 - 14:00	353	389	342	0	19	9	7	9	1	0	0	9
14:00 - 15:00	393	322	405	1	6	11	17	6	3	0	3	47
15:00 - 16:00	357	375	388	1	3	10	17	3	1	0	3	41
16:00 - 17:00	415	350	320	1	8	7	18	3	0	0	0	16
17:00 - 18:00	328	337	333	1	6	14	17	2	0	0	0	28
18:00 - 19:00	362	388	364	1	6	14	18	1	0	0	0	31
19:00 - 20:00	349	390	307	4	11	15	20	0	0	2	1	25
20:00 - 21:00	308	259	356	0	8	9	22	3	0	0	0	16
21:00 - 22:00	344	155	358	0	6	9	11	0	0	0	0	12
16hr Total	**6319**	**5458**	**5869**	**24**	**147**	**247**	**294**	**111**	**6**	**6**	**7**	**285**

Station 5 (Evacomm)

Road	Canaynay Ave
Section	Evacomm
Direction	1
Date	10-Apr-19

Hourly Summaries

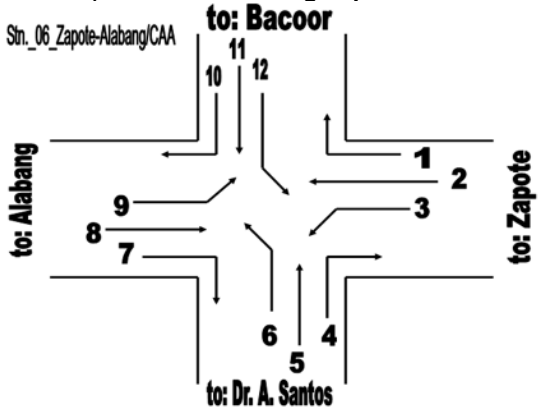
Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	462	137	562	39	338	101	0	134	115	12	9	260
7:00 - 8:00	453	131	503	20	275	58	1	123	106	24	13	206
8:00 - 9:00	432	116	499	65	336	91	4	108	57	20	12	199
9:00 - 10:00	350	134	423	85	267	102	0	123	62	17	4	146
10:00 - 11:00	402	95	160	47	137	55	0	152	72	68	55	135
11:00 - 12:00	199	50	122	31	105	33	0	136	50	35	32	82
12:00 - 13:00	160	35	164	2	101	17	1	34	17	10	2	81
13:00 - 14:00	244	7	329	4	30	3	0	45	9	0	1	76
14:00 - 15:00	318	27	358	2	62	0	0	141	40	17	5	155
15:00 - 16:00	244	0	362	0	74	0	0	195	84	21	1	224
16:00 - 17:00	161	11	284	0	4	0	2	211	73	29	5	215
17:00 - 18:00	168	8	189	0	33	0	2	127	23	8	4	113
18:00 - 19:00	135	8	158	0	20	0	0	66	34	1	0	79
19:00 - 20:00	123	14	144	0	51	5	2	75	25	10	5	80
20:00 - 21:00	195	11	228	2	95	13	6	55	15	10	2	107
21:00 - 22:00	111	0	112	0	47	24	0	37	8	5	7	46
16hr Total	**4157**	**784**	**4597**	**297**	**1975**	**502**	**18**	**1762**	**790**	**287**	**157**	**2204**

Road	Canaynay Ave
Section	Evacomm
Direction	2
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	301	250	215	236	228	279	40	41	0	21	4	125
7:00 - 8:00	239	106	240	145	123	174	20	20	0	0	0	59
8:00 - 9:00	150	95	185	98	74	29	33	31	0	15	0	96
9:00 - 10:00	190	62	254	39	72	12	8	8	0	11	0	55
10:00 - 11:00	108	171	160	131	96	138	0	20	15	14	9	72
11:00 - 12:00	159	97	114	141	141	82	0	7	0	10	0	85
12:00 - 13:00	160	145	130	105	84	77	16	63	56	18	56	89
13:00 - 14:00	131	56	100	81	11	13	16	8	6	12	7	62
14:00 - 15:00	130	95	118	81	81	56	12	60	27	23	34	74
15:00 - 16:00	135	79	200	51	9	14	10	20	5	18	12	73
16:00 - 17:00	130	69	215	105	83	83	0	75	59	24	3	32
17:00 - 18:00	90	62	195	51	51	51	0	45	12	9	0	32
18:00 - 19:00	135	96	150	69	170	55	0	9	11	7	5	79
19:00 - 20:00	185	78	185	57	62	31	0	10	21	0	0	44
20:00 - 21:00	210	107	177	78	135	65	22	29	32	12	23	140
21:00 - 22:00	79	48	108	50	48	40	5	12	2	7	2	19
16hr Total	**2532**	**1616**	**2746**	**1518**	**1468**	**1199**	**182**	**458**	**246**	**201**	**155**	**1136**

Station 6 (CAA Road/Alabang Zapote Road Intersection)



Road	Zapote-Alabang/CAA Intersection
Section	
Direction	1
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	24	0	19	0	0	0	0	0	1	0	0	0
7:00 - 8:00	24	1	26	0	0	1	0	0	0	0	0	1
8:00 - 9:00	27	0	35	0	1	0	0	1	0	0	0	2
9:00 - 10:00	30	0	34	1	0	0	0	1	0	0	0	3
10:00 - 11:00	45	1	38	1	0	0	0	3	0	0	0	3
11:00 - 12:00	50	1	34	1	0	0	0	0	0	0	0	3
12:00 - 13:00	48	0	27	0	0	0	0	0	0	0	0	1
13:00 - 14:00	48	0	33	1	1	0	0	1	0	0	0	3
14:00 - 15:00	62	0	37	1	0	0	0	1	0	0	0	1
15:00 - 16:00	54	0	113	0	1	0	0	2	0	0	0	2
16:00 - 17:00	48	2	49	0	2	0	0	0	0	0	0	0
17:00 - 18:00	44	1	35	0	2	0	1	0	0	0	0	1
18:00 - 19:00	48	1	40	1	0	0	0	0	0	0	0	1
19:00 - 20:00	33	1	18	1	0	2	0	0	0	0	0	1
20:00 - 21:00	28	2	17	0	0	2	0	0	0	0	0	1
21:00 - 22:00	20	0	23	0	2	1	0	0	0	0	0	0
16hr Total	**633**	**10**	**578**	**7**	**9**	**6**	**1**	**9**	**1**	**0**	**0**	**23**

Road	Zapote-Alabang/CAA Intersection
Section	0
Direction	2
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	122	1	68	6	2	46	33	2	1	1	0	4
7:00 - 8:00	116	0	58	1	2	44	51	9	1	0	0	11
8:00 - 9:00	120	1	72	3	0	23	34	3	2	0	0	9
9:00 - 10:00	100	0	83	3	0	22	36	5	1	0	0	7
10:00 - 11:00	111	1	110	2	0	11	24	4	2	0	1	5
11:00 - 12:00	158	1	159	0	0	14	36	5	1	1	0	7
12:00 - 13:00	100	0	86	1	0	10	54	4	1	1	0	5
13:00 - 14:00	77	0	59	0	0	16	24	2	1	0	0	7
14:00 - 15:00	100	0	55	1	1	25	29	4	1	0	0	3
15:00 - 16:00	107	0	63	4	2	7	38	4	1	2	0	5
16:00 - 17:00	117	2	116	4	0	22	19	4	1	1	1	9
17:00 - 18:00	138	1	122	1	2	21	39	1	3	0	0	5
18:00 - 19:00	151	0	85	0	3	10	32	3	1	0	0	0
19:00 - 20:00	140	1	72	0	5	17	36	3	1	0	0	1
20:00 - 21:00	151	0	63	2	13	8	56	0	4	0	0	2
21:00 - 22:00	205	1	69	0	2	9	38	2	5	0	0	1
16hr Total	**2013**	**9**	**1340**	**28**	**32**	**305**	**579**	**55**	**27**	**6**	**2**	**81**

Road	Zapote-Alabang/CAA Intersection
Section	0
Direction	3
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	59	3	81	0	5	0	0	5	0	0	0	6
7:00 - 8:00	155	6	161	0	10	1	0	6	5	0	0	5
8:00 - 9:00	203	7	268	3	9	4	0	16	0	0	0	30
9:00 - 10:00	207	7	234	6	7	4	0	11	0	0	0	24
10:00 - 11:00	92	7	103	4	3	0	0	6	0	0	0	7
11:00 - 12:00	94	4	83	2	6	0	0	6	0	0	0	6
12:00 - 13:00	116	0	99	1	2	1	0	3	1	0	0	7
13:00 - 14:00	94	3	99	1	3	0	0	1	2	0	0	2
14:00 - 15:00	131	10	95	0	4	0	0	5	1	0	0	12
15:00 - 16:00	117	3	122	4	1	0	0	1	0	0	0	14
16:00 - 17:00	86	6	115	2	1	0	0	5	0	0	0	3
17:00 - 18:00	108	11	187	0	6	1	0	9	0	0	0	3
18:00 - 19:00	122	9	159	2	7	3	1	9	0	0	0	2
19:00 - 20:00	116	7	137	2	7	2	0	7	0	0	0	4
20:00 - 21:00	60	6	49	2	3	4	1	2	0	1	0	1
21:00 - 22:00	94	4	86	0	5	2	0	2	0	0	5	1
16hr Total	**1854**	**93**	**2078**	**29**	**79**	**22**	**2**	**94**	**9**	**1**	**5**	**127**

Road	Zapote-Alabang/CAA Intersection
Section	0
Direction	4
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	200	13	169	3	7	6	10	3	8	0	0	5
7:00 - 8:00	140	0	135	4	17	12	19	0	0	0	0	0
8:00 - 9:00	186	9	208	5	14	0	0	3	2	0	0	15
9:00 - 10:00	119	2	158	1	4	1	0	2	4	0	0	6
10:00 - 11:00	167	8	197	5	5	0	0	18	7	0	0	4
11:00 - 12:00	150	4	145	0	7	0	0	11	8	0	0	2
12:00 - 13:00	123	3	184	1	4	0	0	19	8	0	0	1
13:00 - 14:00	132	11	184	4	3	0	0	12	5	0	0	1
14:00 - 15:00	78	5	105	0	5	0	0	6	4	0	0	5
15:00 - 16:00	101	4	106	3	7	0	0	3	4	3	0	3
16:00 - 17:00	124	8	159	5	6	1	0	5	10	0	0	0
17:00 - 18:00	103	6	165	5	6	1	0	6	6	0	0	3
18:00 - 19:00	100	7	151	1	2	2	0	6	1	0	0	4
19:00 - 20:00	91	3	105	0	2	0	0	1	1	0	0	1
20:00 - 21:00	117	6	115	1	2	1	2	2	4	4	1	4
21:00 - 22:00	93	0	79	0	1	0	0	0	0	0	0	6
16hr Total	**2024**	**89**	**2365**	**38**	**92**	**24**	**31**	**97**	**72**	**7**	**1**	**60**

Road	Zapote-Alabang/CAA Intersection
Section	0
Direction	5
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	154	0	97	7	5	2	0	2	0	0	0	4
7:00 - 8:00	191	0	141	6	1	1	0	5	0	0	0	0
8:00 - 9:00	197	0	118	17	2	1	0	4	0	0	0	2
9:00 - 10:00	138	0	84	8	0	0	0	3	0	2	0	4
10:00 - 11:00	179	1	58	6	1	3	0	2	1	0	0	1
11:00 - 12:00	195	0	72	8	6	4	0	1	1	4	0	3
12:00 - 13:00	118	0	44	1	2	1	0	2	0	0	0	2
13:00 - 14:00	179	1	49	16	0	0	0	4	0	0	0	5
14:00 - 15:00	162	0	78	8	1	3	0	0	0	0	0	8
15:00 - 16:00	244	0	73	8	1	0	0	1	1	0	0	2
16:00 - 17:00	249	0	111	4	2	0	0	3	0	0	0	4
17:00 - 18:00	240	0	125	2	0	0	0	5	0	0	0	4
18:00 - 19:00	298	0	145	0	0	0	0	1	0	0	0	2
19:00 - 20:00	294	0	158	0	0	0	0	9	0	0	0	5
20:00 - 21:00	221	1	96	0	1	0	0	0	0	0	0	0
21:00 - 22:00	213	0	159	8	12	5	0	7	0	0	0	2
16hr Total	**3272**	**3**	**1608**	**99**	**34**	**20**	**0**	**49**	**3**	**6**	**0**	**48**

Road	Zapote-Alabang/CAA Intersection
Section	0
Direction	6
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	155	8	276	8	11	6	0	21	0	0	0	10
7:00 - 8:00	94	5	433	4	12	2	0	22	0	0	0	13
8:00 - 9:00	183	4	392	3	4	0	3	20	2	0	0	14
9:00 - 10:00	137	3	343	2	2	3	3	25	1	0	0	19
10:00 - 11:00	185	7	271	4	7	2	2	28	2	1	0	25
11:00 - 12:00	126	6	305	4	8	3	0	22	2	0	0	12
12:00 - 13:00	147	2	195	3	7	1	0	26	3	0	0	12
13:00 - 14:00	153	5	212	5	8	1	1	26	0	0	0	18
14:00 - 15:00	151	8	249	6	6	0	0	27	0	2	0	26
15:00 - 16:00	163	6	269	3	14	0	1	19	0	0	0	17
16:00 - 17:00	166	8	312	1	9	1	5	32	0	0	0	17
17:00 - 18:00	155	9	360	1	14	2	2	13	0	0	0	14
18:00 - 19:00	139	6	308	4	11	1	0	13	0	0	0	9
19:00 - 20:00	150	15	257	6	13	5	6	22	0	0	0	12
20:00 - 21:00	156	14	253	9	14	6	0	16	0	0	0	7
21:00 - 22:00	136	13	253	5	19	9	2	29	0	0	0	15
16hr Total	**2396**	**119**	**4688**	**68**	**159**	**42**	**25**	**361**	**10**	**3**	**0**	**240**

Road	Zapote-Alabang/CAA Intersection
Section	0
Direction	7
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	66	4	300	4	22	1	0	5	1	0	0	8
7:00 - 8:00	115	3	420	2	22	5	1	10	0	0	0	18
8:00 - 9:00	120	3	385	2	14	2	0	32	3	0	0	14
9:00 - 10:00	124	2	316	2	21	3	1	15	2	0	0	9
10:00 - 11:00	122	3	285	5	13	2	1	21	9	0	0	14
11:00 - 12:00	131	1	209	2	19	0	1	15	13	0	1	28
12:00 - 13:00	134	1	270	3	19	0	0	13	5	0	0	14
13:00 - 14:00	143	7	223	8	23	1	0	23	8	0	0	21
14:00 - 15:00	119	3	247	8	13	2	0	13	7	0	1	32
15:00 - 16:00	181	8	264	5	19	1	1	22	6	0	1	28
16:00 - 17:00	142	10	236	2	18	1	1	9	0	0	0	18
17:00 - 18:00	158	9	287	1	11	4	0	13	1	0	0	19
18:00 - 19:00	184	10	344	2	8	1	0	7	0	0	0	11
19:00 - 20:00	228	8	297	1	14	4	1	8	1	0	0	9
20:00 - 21:00	183	10	227	4	17	5	1	10	2	0	1	14
21:00 - 22:00	174	7	204	1	15	1	0	10	8	0	0	7
16hr Total	**2324**	**89**	**4514**	**52**	**268**	**33**	**8**	**226**	**66**	**0**	**4**	**264**

Road	Zapote-Alabang/CAA Intersection
Section	0
Direction	8
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	259	194	288	0	25	16	76	9	0	0	0	19
7:00 - 8:00	243	215	347	0	11	13	61	9	3	0	0	16
8:00 - 9:00	246	150	272	1	14	4	43	9	0	0	0	12
9:00 - 10:00	199	184	282	1	11	4	37	10	8	5	0	15
10:00 - 11:00	271	163	331	2	10	2	35	20	5	4	0	23
11:00 - 12:00	234	183	317	0	2	1	33	19	7	1	0	13
12:00 - 13:00	262	194	316	0	13	2	43	23	9	1	0	29
13:00 - 14:00	278	161	302	0	5	1	45	17	3	3	0	20
14:00 - 15:00	305	204	375	2	4	2	36	14	3	2	0	17
15:00 - 16:00	363	208	385	2	5	9	31	7	0	0	0	10
16:00 - 17:00	267	186	337	1	7	5	34	12	1	0	0	9
17:00 - 18:00	400	162	492	0	6	5	29	8	2	0	0	7
18:00 - 19:00	346	172	366	0	2	13	36	10	0	1	0	2
19:00 - 20:00	356	161	287	0	6	7	37	8	0	0	0	10
20:00 - 21:00	368	146	307	1	14	8	49	5	0	2	0	2
21:00 - 22:00	317	163	286	0	16	11	35	12	1	3	0	11
16hr Total	**4714**	**2846**	**5290**	**10**	**151**	**103**	**660**	**192**	**42**	**22**	**0**	**215**

Road	Zapote-Alabang/CAA Intersection
Section	0
Direction	9
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	355	424	371	1	11	7	101	8	1	0	0	11
7:00 - 8:00	508	502	445	4	7	6	85	1	2	1	0	38
8:00 - 9:00	335	305	400	5	8	11	74	0	0	7	0	19
9:00 - 10:00	315	285	310	3	15	7	70	0	0	5	0	13
10:00 - 11:00	305	280	275	5	9	8	120	6	1	0	0	8
11:00 - 12:00	280	245	257	4	11	5	77	6	0	0	0	16
12:00 - 13:00	240	240	240	6	15	12	78	2	5	0	0	19
13:00 - 14:00	320	300	333	1	13	2	88	2	4	0	0	20
14:00 - 15:00	300	280	290	3	12	9	57	16	12	2	0	19
15:00 - 16:00	255	176	219	2	9	7	21	2	0	0	0	10
16:00 - 17:00	285	255	260	0	2	8	41	4	0	0	0	7
17:00 - 18:00	368	346	380	0	11	11	47	5	1	0	0	3
18:00 - 19:00	345	330	350	0	7	14	47	3	0	1	0	5
19:00 - 20:00	223	225	215	0	4	11	35	2	0	1	0	3
20:00 - 21:00	200	165	114	0	1	10	37	6	1	0	0	1
21:00 - 22:00	240	245	200	0	4	10	32	3	1	4	0	2
16hr Total	**4874**	**4603**	**4659**	**34**	**139**	**138**	**1010**	**66**	**28**	**21**	**0**	**194**

Road	Zapote-Alabang/CAA Intersection
Section	0
Direction	10
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	77	3	63	2	15	11	2	2	0	0	0	7
7:00 - 8:00	119	4	91	4	0	7	1	2	0	0	0	4
8:00 - 9:00	111	1	88	6	4	7	0	3	0	0	0	15
9:00 - 10:00	129	1	72	5	0	0	0	2	0	0	0	23
10:00 - 11:00	163	0	86	5	0	0	0	4	0	0	0	11
11:00 - 12:00	120	2	68	1	0	0	0	5	0	0	0	2
12:00 - 13:00	71	0	31	1	2	0	0	0	0	0	0	2
13:00 - 14:00	124	0	72	1	1	0	0	5	0	0	0	22
14:00 - 15:00	127	0	91	3	2	0	1	11	5	0	0	19
15:00 - 16:00	100	0	85	4	0	0	0	3	1	0	0	23
16:00 - 17:00	91	2	97	6	2	0	0	2	0	0	0	13
17:00 - 18:00	93	0	72	1	1	0	0	1	0	0	0	16
18:00 - 19:00	92	0	64	6	2	0	0	1	0	0	0	7
19:00 - 20:00	56	0	44	2	5	0	0	2	0	0	0	3
20:00 - 21:00	43	0	62	4	7	0	0	6	2	0	0	6
21:00 - 22:00	45	0	51	1	3	0	0	3	1	0	0	1
16hr Total	**1561**	**13**	**1137**	**52**	**44**	**25**	**4**	**52**	**9**	**0**	**0**	**174**

Road	Zapote-Alabang/CAA Intersection
Section	0
Direction	11
Date	10-Apr-19

Hourly Summaries

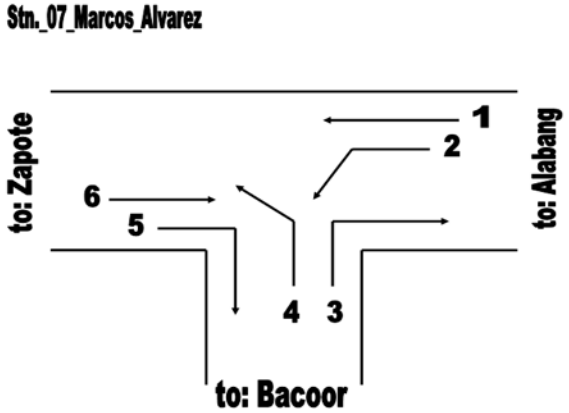
Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	496	2	311	10	3	2	0	9	6	0	0	6
7:00 - 8:00	437	0	334	11	5	0	0	15	0	0	0	0
8:00 - 9:00	296	0	228	6	1	0	0	4	0	0	0	1
9:00 - 10:00	89	2	106	2	4	0	0	3	0	0	0	2
10:00 - 11:00	127	2	114	4	4	0	0	2	0	0	0	3
11:00 - 12:00	121	1	101	6	3	1	0	1	0	0	0	5
12:00 - 13:00	110	1	111	3	2	0	0	0	0	0	0	2
13:00 - 14:00	147	2	140	9	6	2	0	0	0	0	0	3
14:00 - 15:00	130	0	84	6	1	1	0	3	0	0	0	6
15:00 - 16:00	187	0	126	5	1	1	0	6	0	0	0	12
16:00 - 17:00	157	0	125	8	2	0	0	0	0	0	0	11
17:00 - 18:00	201	0	137	10	2	2	0	7	0	0	0	8
18:00 - 19:00	175	1	117	8	4	5	0	8	0	0	0	12
19:00 - 20:00	133	0	109	6	3	2	0	7	0	0	0	10
20:00 - 21:00	108	3	100	9	4	1	0	4	0	0	0	3
21:00 - 22:00	111	1	115	10	7	4	0	5	0	0	0	4
16hr Total	**3025**	**15**	**2358**	**113**	**52**	**21**	**0**	**74**	**6**	**0**	**0**	**88**

Road	Zapote-Alabang/CAA Intersection
Section	0
Direction	12
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	41	0	18	0	0	1	1	0	0	0	1	1
7:00 - 8:00	30	0	9	0	0	0	1	0	0	0	1	0
8:00 - 9:00	42	2	12	0	1	0	0	0	0	0	0	1
9:00 - 10:00	41	1	17	1	2	0	0	0	0	0	0	0
10:00 - 11:00	59	1	19	1	1	0	0	1	0	0	0	2
11:00 - 12:00	56	3	17	2	1	0	0	0	0	0	0	2
12:00 - 13:00	44	0	10	1	1	0	0	0	0	0	0	1
13:00 - 14:00	48	0	18	1	1	0	0	0	0	0	0	2
14:00 - 15:00	50	0	32	0	1	0	0	1	0	0	0	1
15:00 - 16:00	46	0	15	0	0	0	0	2	0	0	0	0
16:00 - 17:00	45	0	19	1	1	0	0	0	0	0	0	0
17:00 - 18:00	60	5	26	1	1	0	0	0	0	0	0	3
18:00 - 19:00	40	0	21	0	0	2	0	1	0	0	0	3
19:00 - 20:00	46	1	19	0	2	5	0	0	0	0	0	0
20:00 - 21:00	34	1	16	1	0	2	0	0	0	0	0	1
21:00 - 22:00	32	0	11	0	1	0	0	0	0	0	0	0
16hr Total	**714**	**14**	**279**	**9**	**13**	**10**	**2**	**5**	**0**	**0**	**2**	**17**

Station 7 (Marcos Alvarez Avenue/Alabang Zapote Road Intersection)



Road	Zapote-Alabang/M Alvarez Ave Intersection
Section	
Direction	1
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	195	233	256	17	31	40	53	15	0	5	1	16
7:00 - 8:00	213	255	288	16	44	42	58	19	0	1	0	21
8:00 - 9:00	219	245	265	11	30	40	50	25	0	2	0	19
9:00 - 10:00	203	206	230	10	24	37	66	17	0	0	1	23
10:00 - 11:00	240	221	236	12	20	34	57	27	0	1	1	22
11:00 - 12:00	288	245	220	35	16	34	29	15	3	1	0	20
12:00 - 13:00	157	108	92	17	6	7	19	5	4	2	0	4
13:00 - 14:00	137	156	100	24	9	11	16	3	1	2	2	4
14:00 - 15:00	177	189	188	8	18	30	55	10	4	3	1	12
15:00 - 16:00	162	156	177	12	14	22	59	16	3	1	0	13
16:00 - 17:00	135	117	121	13	15	16	25	14	6	3	0	12
17:00 - 18:00	153	147	151	9	14	16	24	16	4	2	2	16
18:00 - 19:00	165	277	164	16	13	16	10	4	5	1	1	6
19:00 - 20:00	152	222	172	7	11	24	50	11	3	1	0	9
20:00 - 21:00	210	228	209	6	10	24	46	16	9	5	1	12
21:00 - 22:00	194	190	184	9	8	20	57	21	4	1	5	15
16hr Total	**3000**	**3195**	**3053**	**222**	**283**	**413**	**674**	**234**	**46**	**31**	**15**	**224**

Road	Zapote-Alabang/M Alvarez Ave Intersection
Section	0
Direction	2
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	126	198	244	1	11	30	7	9	0	1	0	1
7:00 - 8:00	204	237	249	2	1	12	2	15	0	1	0	5
8:00 - 9:00	194	204	235	7	2	20	2	19	2	1	0	20
9:00 - 10:00	195	198	230	5	3	4	1	18	3	0	0	26
10:00 - 11:00	157	163	232	3	6	1	3	16	8	0	0	12
11:00 - 12:00	216	229	231	5	4	2	3	28	2	1	0	11
12:00 - 13:00	143	138	168	2	5	5	0	14	13	1	0	21
13:00 - 14:00	151	151	156	1	4	1	0	11	9	0	1	9
14:00 - 15:00	184	140	148	0	3	9	0	14	6	2	1	11
15:00 - 16:00	140	107	119	0	9	9	0	14	12	0	0	18
16:00 - 17:00	174	118	122	0	4	7	1	13	2	0	0	14
17:00 - 18:00	159	164	209	0	4	6	0	13	6	1	0	9
18:00 - 19:00	151	137	224	0	11	2	0	7	3	0	0	4
19:00 - 20:00	162	136	185	0	13	2	0	3	2	0	0	1
20:00 - 21:00	187	143	199	0	11	3	0	4	2	0	0	7
21:00 - 22:00	141	95	121	0	20	7	0	0	1	1	0	5
16hr Total	**2684**	**2558**	**3072**	**26**	**111**	**120**	**19**	**198**	**71**	**9**	**2**	**174**

Road	Zapote-Alabang/M Alvarez Ave Intersection
Section	0
Direction	3
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	130	137	153	0	31	20	19	16	3	1	0	13
7:00 - 8:00	155	126	143	0	7	5	6	18	1	0	0	16
8:00 - 9:00	128	124	141	6	6	5	2	28	0	0	0	20
9:00 - 10:00	138	137	136	7	8	4	2	26	0	0	0	23
10:00 - 11:00	207	133	181	8	9	3	3	28	1	1	1	21
11:00 - 12:00	147	136	161	7	9	3	3	9	6	1	0	13
12:00 - 13:00	64	69	66	1	5	1	1	10	2	1	0	0
13:00 - 14:00	52	52	67	1	7	0	2	9	2	1	1	2
14:00 - 15:00	94	70	72	3	3	0	1	11	4	1	0	7
15:00 - 16:00	111	48	71	1	5	0	0	9	3	0	0	7
16:00 - 17:00	85	63	55	1	4	1	0	6	5	1	0	2
17:00 - 18:00	113	63	108	3	5	0	0	4	2	0	1	0
18:00 - 19:00	102	53	81	2	3	0	0	6	1	0	0	3
19:00 - 20:00	87	94	84	4	8	0	0	3	6	1	0	1
20:00 - 21:00	71	76	104	3	9	0	0	4	1	1	0	2
21:00 - 22:00	71	70	85	4	4	3	0	2	5	0	0	1
16hr Total	**1755**	**1451**	**1708**	**51**	**123**	**45**	**39**	**189**	**42**	**9**	**3**	**131**

Road	Zapote-Alabang/M Alvarez Ave Intersection
Section	0
Direction	4
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	276	301	356	73	120	78	101	32	0	1	0	116
7:00 - 8:00	225	193	298	22	153	127	174	18	0	1	0	95
8:00 - 9:00	145	211	265	5	150	97	125	66	11	0	0	52
9:00 - 10:00	149	121	216	0	111	110	101	55	23	1	0	81
10:00 - 11:00	167	124	186	0	93	53	97	80	13	4	0	70
11:00 - 12:00	172	136	260	2	74	100	116	75	19	1	1	100
12:00 - 13:00	209	214	135	32	12	26	40	23	6	0	0	42
13:00 - 14:00	173	165	180	15	31	14	52	52	2	1	0	13
14:00 - 15:00	175	158	211	8	87	80	109	87	36	0	0	105
15:00 - 16:00	135	125	173	2	82	86	103	67	35	0	0	93
16:00 - 17:00	128	149	229	1	122	110	101	82	27	3	1	81
17:00 - 18:00	136	135	188	2	174	133	84	85	25	2	0	86
18:00 - 19:00	142	131	134	0	60	43	33	41	19	2	1	37
19:00 - 20:00	181	142	147	5	68	58	71	52	12	0	0	49
20:00 - 21:00	167	150	189	5	62	50	75	37	14	1	0	43
21:00 - 22:00	179	176	186	8	59	40	41	33	12	1	0	29
16hr Total	**2759**	**2631**	**3353**	**180**	**1458**	**1205**	**1423**	**885**	**254**	**18**	**3**	**1092**

Road	Zapote-Alabang/M Alvarez Ave Intersection
Section	0
Direction	5
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	310	253	248	63	136	57	134	21	6	0	0	41
7:00 - 8:00	322	235	318	24	79	22	125	16	4	0	0	40
8:00 - 9:00	273	229	228	2	17	7	136	15	5	0	0	21
9:00 - 10:00	286	266	321	0	73	2	225	38	13	1	0	40
10:00 - 11:00	241	204	238	8	82	39	158	15	8	2	1	71
11:00 - 12:00	240	191	214	8	61	31	189	25	5	0	0	62
12:00 - 13:00	137	84	138	11	30	8	99	16	4	2	0	29
13:00 - 14:00	168	127	130	6	32	9	91	15	4	1	0	26
14:00 - 15:00	210	212	182	12	19	17	42	15	8	1	1	16
15:00 - 16:00	210	182	194	8	21	14	51	10	10	0	0	13
16:00 - 17:00	139	110	118	6	26	22	62	23	8	3	1	21
17:00 - 18:00	147	112	112	5	38	35	76	16	3	0	1	38
18:00 - 19:00	163	155	143	20	14	26	132	11	10	2	1	23
19:00 - 20:00	262	195	151	15	17	17	208	19	5	0	0	29
20:00 - 21:00	255	246	277	11	65	20	109	12	6	1	1	44
21:00 - 22:00	289	230	232	11	41	15	148	10	6	0	0	23
16hr Total	**3652**	**3031**	**3244**	**210**	**751**	**341**	**1985**	**277**	**105**	**13**	**6**	**537**

Road	Zapote-Alabang/M Alvarez Ave Intersection
Section	0
Direction	6
Date	10-Apr-19

Hourly Summaries

Time	Car	PUJ	Motorcycle	Tricycle	Taxi	UV Express	Bus	2-axle Rigid Trucks	3>axle Rigid Trucks	4-axle Trailer Truck	5> axle Trailer Truck	Light Cargo
6:00 - 7:00	228	231	233	14	19	27	37	25	3	2	0	21
7:00 - 8:00	255	218	236	13	14	16	26	24	4	1	1	27
8:00 - 9:00	313	298	289	20	23	17	21	23	4	1	0	26
9:00 - 10:00	326	337	332	15	25	16	27	19	1	1	1	28
10:00 - 11:00	304	262	246	26	13	12	16	14	2	1	1	16
11:00 - 12:00	219	203	138	18	13	13	17	7	5	0	0	11
12:00 - 13:00	160	141	127	14	16	16	24	15	3	2	1	13
13:00 - 14:00	200	165	135	12	17	14	11	18	0	2	0	15
14:00 - 15:00	205	187	138	13	11	14	11	12	3	1	1	9
15:00 - 16:00	138	155	164	4	18	13	22	9	5	0	0	12
16:00 - 17:00	180	167	165	6	11	13	19	12	8	1	0	11
17:00 - 18:00	250	255	274	5	9	8	11	13	3	1	0	9
18:00 - 19:00	292	301	317	1	17	21	33	14	8	0	0	16
19:00 - 20:00	320	281	270	2	18	19	39	13	3	1	1	31
20:00 - 21:00	225	204	199	4	14	15	25	14	3	3	1	13
21:00 - 22:00	236	275	221	1	14	20	14	20	4	1	0	17
16hr Total	**3851**	**3680**	**3484**	**168**	**252**	**254**	**353**	**252**	**59**	**18**	**7**	**275**

APPENDIX 20. PEMAPS QUESTIONNAIRE

PROJECT ENVIRONMENTAL MONITORING AND AUDIT PRIORITIZATION SCHEME (PEMAPS) QUESTIONNAIRE

Project Name	:	LRT Line-6A and Line-6B+C Project
Project Location	:	Cities of Las Piñas, Parañaque, Muntinlupa, Bacoor and Dasmariñas
ECC Reference No.	:	
Proponent	:	Prime Asset Ventures, Inc.
Pollution Control Officer	:	
Tel. No./Fax No./Email	:	02.225.3552 local 1041
Project Type	:	New elevated railway system
Project Status	:	New

I. PROJECT CONSIDERATIONS

Size and Type

Size based on number of employees

Specify number of employees: 1,200

Type

ECP (in either ECA or Non-ECA)	√
Non-ECP but in ECA	
Non-ECP and Non-ECA	

Waste Generation and Management

Enumerate Waste Type and Specify Quantity of Wastes generated in your facility. (Identify /Enumerate)

Category	Waste	Type		Quantity
		Hazardous	Non-Hazardous	
Air	Waste 1			(units: MT/yr)
	Waste 2			
	Waste N			
Liquid				(units: m^3/yr)
		√	√	
Solid				(units: tons/yr)
		√	√	

Pollution Control System (PCS)

Enumerate PCS or Waste Management Method Used in your facility. (Identify /Enumerate)

Category	PCS/Waste Management Method Used	Remarks
Air	PCS 1	
	PCS 2	
	PCS N	
Liquid	Primary	
	Secondary	
	Tertiary	
Solid		

II. PATHWAYS

Prevailing wind towards barrio or city? (Mark the corresponding point) Yes __√__ No ____

Rainfall (impacts surface & groundwater pathways)

Average annual net rainfall

Specify amount: 1,767.9 - 1,970.2 mm

PROJECT ENVIRONMENTAL MONITORING AND AUDIT PRIORITIZATION SCHEME (PEMAPS) QUESTIONNAIRE

Maximum 24-hour rainfall:

Specify amount: 475.4 mm

Terrain (select one and mark) Flat √ Steep ____

Is the facility located in a flood-prone area? (select one and mark) Yes __ No

Ground Water

Depth of groundwater table (meter) (select one and mark)

0 to less than 3	
3 to 10	
Greater than 10	√

III. RECEIVING MEDIA/RECEPTORS

Air (Distance to nearest community) (select one and mark)

0 to less than 0.5 km	√
0.5 to 1 km	
Greater than 1 km	

Receiving Surface Water Body

Distance to receiving surface water: (select one and mark)

0 to less than 0.5 km	√
0.5 to 1 km	
Greater than 1 km	

Size of population using receiving surface water

Specify number:

Fresh Water

Classification of fresh water (select one and mark)

AA	
A	
B	
C	√
D	

Size of fresh water body

Specify size: (units: km^2)

Economic value of water use (may select more than one of the criteria below)

Drinking	
Domestic	
Recreational	
Fishery	
Industrial	√
Agricultural	

Salt water

Classification of salt water (select one and mark)

SA	
SB	
SC	
SD	

PROJECT ENVIRONMENTAL MONITORING AND AUDIT PRIORITIZATION SCHEME (PEMAPS) QUESTIONNAIRE

Economic value of water use (may select more than one of the criteria below)

Fishery	
Tourist zone or park	
Recreational	
Industrial	

Ground Water

Distance to nearest recharge area (select one and mark)

0 to less than 0.5 km	
0.5 to 1 km	
Greater than 1 km	

Distance to nearest well used (select one and mark)

0 to less than 0.5 km	
0.5 to 1 km	
Greater than 1 km	

Groundwater use within the nearest well (may select more than one of the criteria below)

Drinking	√
Industrial	√
Agricultural	

Land

Indicate current/actual land uses within 0.5 km radius (may select more than one of the criteria below)

Residential	√
Commercial/Institutional	√
Industrial	√
Agricultural/Recreational	√
Protected Area	

Potential/proposed land uses within 0.5 km (may select more than one of the criteria below)

Residential	√
Commercial/Institutional	√
Industrial	√
Agricultural/Recreational	√
Protected Area	

Number of affected Environmentally Critical Areas within 1 km:

Specify number:

Distance to nearest ECA (select one and mark)

0 to less than 0.5km	
0.5 to 1 km	
Greater than 1 km	√

IV. ENVIRONMENTAL PERFORMANCE

Compliance (pls. take note that this will be double-checked with PCD files)

PROJECT ENVIRONMENTAL MONITORING AND AUDIT PRIORITIZATION SCHEME (PEMAPS) QUESTIONNAIRE

Law	Violation (check if any)	Type (pls. specify number of times committed) STANDARD				Type of Admin Violation	Additional Remarks/Status of Compliance
		Emission/Effluent/ Discharge	Ambient	Human Impact	Admin/ ECC		
RA 8749							
RA 9275							
RA 6969							
PD 1586							
RA 9003							

Number of Valid Complaints

Citizen and NGOs

Specify number: None

Others (other Govt. Agencies, Private Institutions)
Specify number: None

(To be filled up by EMB Personnel)

RECOMMENDATION/S:

Assessed By:

Noted By:

PROJECT ENVIRONMENTAL MONITORING AND AUDIT PRIORITIZATION SCHEME (PEMAPS) QUESTIONNAIRE

ACCOUNTABILITY STATEMENT OF PROJECT PROPONENT

This is to certify that all information in the submitted Project Environmental Monitoring and Audit Priontization Scheme (PEMAPS) Questionnaire of the LRT Line-6A and Line-6B+C Project located at Metro Manila and Cavite is true, accurate and complete. Should I learn of any information which makes this inaccurate, I shall bring said information to the appropriate Environmental Management Bureau Regional Office.

In witness whereof, I hereby set out my hands this 13 JUN 2019 day of _____ 2019 at _____

Tony Tan
PAVI

SUBSCRIBED AND SWORN to before me this 13 JUN 2019 day of _____ 2019 at _____ Affiant exhibiting to me his/her Community Tax Certificate No. _____ issued on _____

Doc. No. 187
Page No. 38
Book No. II-A
Series of 2019

ATTY. ROGELIO J. BOLIVAR
NOTARY PUBLIC IN QUEZON CITY
Adm. Not. Com No. NP-124 1-12-19 Until 12-31-2020
IBP O.R. No. 055255 Jan. 2019 / IBP O.R. No. 055256 Jan. 2020
PTR O.R. No. 7376155C 1/7/19/ Roll No. 33692/ TIN No. 129-871-009
MCLE No. V-0019295 Valid From 04/14/2019/ PASIG CITY
Address: 31 Harvard St. Cubao, Q.C